SUSTAINABLE DEVELOPMENT
CROSSING BORDERS, BREAKING STEREOTYPES

EDITORS
MIROSŁAWA CZERNY
CIRO ALFONSO SERNA MENDOZA



WYDAWNICTWA UNIWERSYTETU WARSZAWSKIEGO
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Eje cafetero *(Coffee belt, Colombia) – houses that once belonged to coffee plantation owners are converted into guesthouses and hotels. This zone is often visited by foreign tourists.*

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Contents

Introduction 9
Mirosława Czerny, Ciro Alfonso Serna Mendoza

I. Understanding and implementing the concept of sustainable development

Eco-accounting: a vision for "the Care of the Common" from the thought-feeling perspective 15
Ciro Alfonso Serna Mendoza, Eutimio Mejía Soto

Ecosystem services as determinants of poverty 23
Hanna Orjuela, Duván Ramírez

Bio-accounting recognition approach of agronomic properties in *Brachiaria humidicola* pastures under a Silvopastoral System in the humid Amazon tropics 38
Víctor Julio Balanta Martínez, Ciro Alfonso Serna Mendoza

II. Regional issue

Peace, healthy environment, and autonomy. Agroecological practices as transformation alternative in Colombian rural Andean communities 57
Diana María Rodríguez-Herrera, Luisa María Achicanoy Gómez, Aida Milena García Arenas

Environmental governance in south-central Caldas, a reflection on public policy for risk management 66
Jaime Mejía Gutiérrez

Infrastructure megaprojects observed: "the Grid" and "the Prophecies" 78
Paweł Wiechetek

Determinants of the intensity of environmental conflicts in Latin America. Statistical perspective 89
Maciej Kałaska

III. Urban issue and sustainability

Megacity Buenos Aires and its most recent conurbation impact 101
Gustavo D. Buzai, Claudia A. Baxendale, Eloy Montes Galbán

Urban conflicts over the space. The case of Manizales, Colombia 114
Mirosława Czerny, Andrzej Czerny

Functions of public space and virtual space – a post-pandemic scenario 127
Dorota Mantey

Revitalisation and adaptation of cities in Poland. Inconsistent processes 147
Agnieszka Dudzińska-Jarmolińska, Karolina Ćwiklińska

Discount trade in big city space – development or regress of a phenomenon? . . . 164
Magdalena Fuhrmann

Architecture styles in the process of spatial nationalization on the example of interwar Bydgoszcz 177
Jan Szczepański

Vegetation and 'Biophilia' from architectural design 189
César Alejandro Vargas Esperón

The appropriation of public space in the Gasca community. A battered star 203
Alejandra Ojeda Sampson

IV. Sustainability, social issues, governance

Social and territorial inequality in Colombia 213
Luis Alfredo Muñoz Velasco, Sylwia Kulczyk

Rural youth and migration. Lessons learned in times of pandemic 231
Claudia Jurado Alvarán

Citizen electoral participation for Colombian sustainable development 243
Hernando Gil Tovar

(Dis)ordered bodies: gender and territorial planning in La Celia, Risaralda, Colombia 262
Juan Camilo Betancur Jaramillo

Citizens, territory and disaster risk: a complex relationship for participation in Colombia 270
Tulia Elena Hernández Burbano, Javier Gonzaga Valencia Hernández

V. Nature and conflicts over sustainable development

Integral diagnosis and conservation strategies for the Otomí Mexica Park of the State of Mexico. A systemic analysis on protected natural areas 281
Jesús Gastón Gutiérrez Cedillo, Luis Miguel Espinosa Rodríguez, Daniel Villegas Martínez

Objective six of sustainable development 2030: characterization in hydrosocial territory in the south of the State of Mexico 295
Alan Noe Jim Carrillo Arteaga, Jesús Castillo Nonato

Industrialization of the Amazon, a dialectical antagonism 309
Yuri Sandoval Montes, Gema Elvira Rios Araníbar

Heat sources in the Eastern region of Bolivia between 2000 to 2019 317
Guillermina Miranda Torrez

Trade trends in cyberspace before COVID-19. The case of online commerce in Mexico 336
Martha Cedillo Alonso, Francisco Monroy Gaytán, Rodrigo Huitrón Rodríguez

COVID-19 in Mexico. Space-time behavior from the socio-spatial constraints, February–October, 2020 349
Marcela Virginia Santana Juárez, Giovanna Santana Castañeda, Luis Ricardo Manzano Solís, Noel Bonfilio Pineda Jaimes, Rebeca Angélica Serrano Barquín

Facing sanitarian crisis: between sustainability and compatibility 361
Guillermo Torres Carral

Water management: environmental and social impacts of dam construction 368
Bruna Angela Branchi, Cibele Roberta Sugahara, Denise Helena Lombardo Ferreira

Economic valuation of flood control ecosystem service in natural wetlands. State of the art 376
Christian Alejandra Vidal Sierra, Ciro Alfonso Serna Mendoza, Coral Jazvel Pacheco Figueroa, Gloria Yaneth Flórez Yepes

VI. Education about and application of sustainable development

Earth science in education and its purpose in liquid modernity 389
Ciro Alfonso Serna Mendoza, Diana Sofía Serna Giraldo

"How were we supposed to know?" – the problem of embedding education for sustainable development in the learning process. Examples of New Zealand, France and Poland 400
Małgorzata Klein

Equal access to education as an aspect to serve Mexico vulnerable population by 2020 411
Agustín Olmos Cruz

Do SDGs have a transformative power? 2020 Human Development Report *The next frontier. Human development and the Anthropocene* as a new perspective to view Sustainable Development Goals 422
Bogumiła Lisocka-Jaegermann

Introduction

The scientific discussion on sustainable development has been held in world literature for several decades. The publishers of the University of Warsaw have joined this discussion thanks to their publication. Researchers from the Faculty of Geography and Regional Studies of the University, together with colleagues from Latin American universities, study the application of sustainable development strategies in Latin America and Poland's regions and cities, legal and institutional issues of environmental protection, grassroots development initiatives based on respect for nature, social conditions for the implementation of sustainable development strategies, environmental education and others. This joint research, discussions during seminars and international congresses in Poland and Latin America have resulted in many monographs and scientific articles that have been published over the last decade.

Undoubtedly, an important voice in this discussion are the works published in recent years by the WUW (The University of Warsaw Press), among others, under the scientific editorship of geographers from the University of Warsaw. Among these works one should mention: Czerny M., Serna Mendoza C.A. (eds.). (2018). *Globalización y desarrollo sostenible*; Czerny M., Serna Mendoza C.A. (eds.). (2018). *Texto y contexto en el desarrollo sostenible*. Warsaw: WUW; Czerny M. (2016). *Rozwój zrównoważony obszarów wiejskich na globalnym Południu*. Warsaw: WUW; Czerny M., Doroszewicz W. (eds.). (2015). *Sustainable development in peripheral regions*. Warsaw: WUW, as well as monographs published by other publishers: Czerny M., Córdova Aguilar H. (2018). *Sustainable Development. The Context of Use of Indigenous Plants for Local Economic Growth*. New York: Nova Science Publishers; Córdova Aguilar H., Czerny M., Novoa Goicochea Z. (comp). (2016). *Ordenamiento territorial y desarrollo rural*. Lima, Perú: Sociedad Geográfica; Czerny M., Córdova Aguilar H. (com.). 2015. *Desarrollo sustentable en regiones rurales y periféricas*. Quito, Ecuador: Ediciones Abya-Yala, and others.

This volume on sustainable development is the result of a scientific discussion that has continued for many years with scientists from Latin American universities. Together with the researchers from the Universidad de Manizales, the Universidad Autónoma del Estado de México in Toluca and others, we point out new elements in thinking about sustainable development and the directions of change in both the concept itself and its application.

The texts presented in the monograph analyse six key areas in which discourse on sustainable development is conducted. The first section includes three articles on general sustainability issues. A specific introduction to the whole monograph is the noteworthy article by Ciro Alfonso Serna Mendoza, Eutimio Mejía Soto entitled "Eco-accounting: a vision for »the Care of the Common Home« from the thought-feeling perspective", in which the authors address current problems related to the implementation of the sustainable development strategy. The two other texts in this section deal with different aspects of understanding sustainable development.

Part two contains texts on regional issues. As far as regional development is concerned, various processes that have an impact on sustainable development, or lack thereof, are presented and analysed.

In the third part, the invited authors show urban space through the prism of sustainable development. Eight different texts are presented, which are devoted to the issues of metropolisation, architecture, green policies and the role of public space in Polish and Latin American cities.

Part four extends the field of investigation of our monograph to social issues and governance. This part shows examples from Colombia. It emphasises governance issues in the context of sustainable development. Undoubtedly, from a cognitive point of view, the most important article in this part is Hernando Gil Tovar's text on "Citizen electoral participation for Colombian sustainable development". In general, sustainable development issues in Colombia's regional strategies and plans are very clearly articulated and can provide a basis for discussion on the role of the authorities in drawing up development plans using this strategy and the active participation of various social groups in this process.

The fifth part contains texts that refer to the original principle of sustainable development, namely environmental protection and conflicts between the use of resources and the human economy. There are six articles, of which the text by Yuri Sandoval Montes and Gema Elvira Rios Araníbar on the risks the Amazon faces draws particular attention ("Industrialisation of the Amazon, a dialectical antagonism"). In the same section, we have included two articles on COVID-19, a new approach to spatial (geographical) analysis in a pandemic situation. One of the authors is Marcela Virginia Santana Juárez, a specialist in medical geography from the UAEM, who writes with her team about "COVID-19 in Mexico. Space-time behavior from the socio-spatial constraints, February-October, 2020".

Finally, a short sixth part on education about and application of sustainable development concludes the monograph.

As we mentioned above, this is another joint Polish-Latin American volume on sustainable development issues. Of course, this time, too, we have not exhausted all the possible topics worthy of discussion. With this volume we are initiating a discussion about new challenges and problems – conflicts,

COVID-19 and environmental awareness, unconventional solutions for greenery in cities and others.

This monograph was created as a set of scientific articles for the pre-congress discussion "Local and regional challenges in the context of the implementation of Sustainable Development Goals". The congress was held at the Faculty of Geography and Regional Studies of the University of Warsaw online from 17 to 19 March 2021 and both the congress and the publication are financed by NAWA – Polish National Agency for Academic Exchange.

Mirosława Czerny, Ciro Alfonso Serna Mendoza

Warszawa – Manizales, January 2021

I. UNDERSTANDING AND IMPLEMENTING THE CONCEPT OF SUSTAINABLE DEVELOPMENT

Eco-accounting: a vision for "the Care of the Common Home" from the thought-feeling perspective

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Introduction

"The urgent challenge of protecting our common home includes the concern to unite the whole human family in the search for sustainable and integral development because we know that things can change" (Francisco, 2015, p. 13). This statement recognizes that the planet is our common meeting place to be protected and safeguarded, enabling a new and responsible interaction between economy and ecology in terms of the stewardship and care of our shared ecosystem. Supporting this premise is confidence in human reason, in its feelings and emotions as determining factors in changing the course of depletion and degradation, moving toward a horizon of natural harmony and respect for the continuity of life in all its splendor.

Trust in human *thought-feeling* implies a recognition of man's multiple and diverse faculties, where feeling and reason are joined in a framework of unity, which in its complex diversity can be subjected to a superior yearning. The same can be said of defense of life. "The concept of *thought-feeling* [was] popularized by master Orlando Fals Borda... Thought-feeling implies thinking from heart and mind, or co-reasoning... it is the way in which territorialized communities have learned the art of living" (Escobar, 2016, p. 16). The feasible utopia of caring for the common home can be achieved if superior commitments to being are achieved, under the tutelage of amoral imperative of sustainability.

What is this guiding human desire called sustainability?

Sustainability is defined as an ethical concept with a scientific [and social cognitive] basis that establishes the capacity of socio-ecological systems to conserve the optimal spatial-temporal biophysical and geophysical conditions for the active preservation of life in all of its manifestations, in terms of quality, quantity, time and space. To achieve it, socioeconomic systems must contemplate the limitations of nature and the impacts of human actions as

part of it; the autonomous-relational integrity of biodiversity and multiculturalism must be recognized in permanent processes of constructive feedback, implying committed actions within the framework of intra- and inter-generational responsibility in the environmental, societal and economic dimensions, allowing progressive internal and external dynamics of eco-systemic processes (Mejía, 2019, p. 98).

The three-dimensional accounting theory 3-DAT representing a commitment to sustainability from the perspective of accounting, is a paradigm shift in the relationship of man with nature, and conceives a new dynamic between ecological and socio-cultural systems, under the principle of ecosystem protection as a source of life and space conducive to its reproduction and extension in time in optimal conditions of dignity. In recent years, accounting researchers have formulated the term eco-accounting, understood as a guiding idea that groups three-dimensional accounting, but transcends it by connecting it to all fields of scientific and non-scientific knowledge, in a clear process of recognizing feeling, dreaming, yearning and utopia as determinants of human action and constructors of new worlds. Accounting is knowledge, eco-accounting is wisdom.

The concept of eco-accounting is addressed in recent semantic shifts by Franco (2019); Álvarez (2019, 2020); Álvarez, Bedoya, Franco and Sanchez (2020); Suárez, Cárdenas, Méndez, Rojas, Castillo, Wilches, Contento and Varela (2020); and Morales and Estrada (2020), who, using the architecture of the political philosophy of knowledge, seek to "establish the relationship nature-culture, placing nature as protagonist to meet it again and recognize it, beyond the definition, as a resource" (Morales, Estrada, 2020, p. 61).The aforementioned authors convey the essence of their proposal in reaching an eco-philosophy defined as "a social wisdom capable of inventing its mediators of socio-cultural animation" (Morales, Estrada, 2020, p. 61).

Eco-accounting depends on life and the sustainability of all forms of existence, in proclamation of the right to co-evolution worthy of all life forms; it is a worldview that moves away from the desires of having to be replaced by the desires of being. Morales and Estrada (2020) based on Panikkader, Guattari, Pupo and Estermann point out that:

> "Eco-philosophy is that wisdom that makes us feel that the Earth is also a subject... [it is] wisdom to inhabit the planet, [to] rescue the local, to know how to live on this planet; it goes beyond the anthropocentric position of the ecological movement, involving its spiritual and global dimension; [where] the human being is a caretaker or guardian of the *pacha* (Earth) and its cosmic order".

In Franco (2019), the authors synthesize the aspiration of eco-accounting, understood as the care for life and the preservation of the biotic and abiotic ecosystem.

Theoretical and conceptual development of eco-accounting

The basis for the term eco-accounting is a recent occurrence in accounting research. Developments in this regard have occurred over five years (2016-2020). The following are the main frames of reference:

1. Fuentes and Peña (2016, 321, 322, 326, 328, 329, 333) based on Suárez's (2015)[1] point out that the multidimensionality of accounting measurement in the Makuna world constitutes an expression of eco-accounting that "must guarantee that the community fertilizes both nature and society in order to keep the balance…", recognizing that "the interdependence of unity and multiplicity are complementary aspects of the world's multidimensional measurement." In that sense, "it is eco-accounting that goes beyond the series of relationships that we call ecological." It is more "a cosmos ecology" where life is committed to "ensuring the succession of periods and life cycles of sentient and non-sentient beings, traveling in time and space". "The Makuna idea of eco-accounting is constitutive of their way of life, and maintains close social ties with the ecological worldview..."; "it is an eco-accounting whose purpose is world fertility".

2. Franco (2019, p. 8, 17, 27, 41, 45, 72, 93) points out that eco-accounting can be seen as an autopoietic system whose purpose "is to capture the mechanism or process that generates the identity of life, and therefore, serve as a categorical distinction between life and non-life". Eco-accounting is conceived of as a superior subordinate knowledge that integrates other aspects of accounting and that deals with control of ecological wealth and whose purpose is life preservation through the principles of responsibility, balance, compensation, and life. The author, supported by Maturana and Varela's "structural coupling", explains the ecosystem-man relationship from the perspective of the unit represented by every living being that interacts with its environment in a biosphere that contains biotic and abiotic elements that are vital in the interaction. The absence of an optimal man-ecosystem relationship implies an ecological and social deterioration, where to face these risks, eco-accounting has an ethical support that legitimizes the presence of the other and its dignifying recognition.

Franco's proposal for the ontological foundation of eco-accounting (2019, p. 6, 13, 56, 57, 64-66) is oriented toward the construction of knowledge in transdisciplinarity, recognizing in accounting a committed knowledge, protected within the framework of axiological principles of the bioethical paradigm,

[1] Suárez, J. (2015). Conversations on eco-accounting in Amazonian Amerindian thought. Personal communication (Recorded by the authors of this work) [material not consulted in this research]. The reference refers to the recordings that the authors made in the development of the master's work "The multidimensional character of accounting measurement in the Makuna" to the director of the respective work, in the Master's Degree in Accounting of the Universidad Libre de Colombia (Bogota).

moving towards a biocentric ontology that respects ecological limits, seeking to guarantee the principle of resilience of tangible ecology in the natural habitat as a whole. Eco-accounting recognizes the emerging fields that overcome the traditional accounting reductionisms; in that sense, it is incorporated to the social accounting and explains the bio-accounting in its condition of new discipline that surpasses the economic-financial limits in its object, function and purpose.

3. Álvarez (2019, p. 35) points out that eco-accounting is in its birth. This birth is a response in opposition to environmental accounting that emerges as dependent on and in service of neoclassical economic approaches. Álvarez (2020, p. 3, 4) conceives of eco-accounting as a Three-Dimensional Theory of Accounting, an amalgamation of three dimensions, economic, biological and social, united by the concepts of wealth ascribed to a patrimony. He thinks that this approach will be supported by open minds that will bet that accounting, ecology, sociology, economy, anthropology, law and other knowledge, as well as the activity of non-conformist and libertarian social groups, will commit to a better future for generations to come.

Álvarez (2020, p. 2, 11) is based on the thinking of the researcher and accountant Antonio Lopes de Sa on the proposal of the primordial functions and especially the "Social Patrimonial Efficiency", understood as the search for the social welfare of nations, "from a perspective of respect for human dignity and security". The author also affirms that eco-accounting, from its first developments, has chosen to follow a critical path in the face of the role that accounting activity has played throughout human history, mainly in the face of the harmful effects that legal and economic models have had on society, and has also chosen to take a critical stance in the face of ecological deterioration, as denounced by organizations and researchers from various platforms. Professor Álvarez (2020, p. 5) conceives the concept of eco-accounting to heritage as "…the legacy of goods and qualities, which the previous generations of a community give and/or transmit to the present and future generations as their riches, which those generations must maintain, conserve and, hopefully, increase to guarantee the continuity and permanence of that community. Therefore, the wealth must be assigned to, or correspond to a heritage".

4. Suárez et al. (2020, p. 27, 62, 69, 120) point out that "the social effectiveness of accounting in Amerindian accounting thought in Colombia is characterized by the union of man and nature", a relationship that complies with the principles of balance, compensation, life and responsibility. "This crucial contribution of Amerindian thought establishes the basis for what we could call «eco-accounting», of which bio-accounting would be a part". The author points out that "the accountant's work is moral", in the sense that it implies an ecological conscience, owing to an accounting that is born public, and configured as a condition of social science to approach the problems of society in a committed manner. In this sense, the author emphasizes probity

as acting with integrity and honesty that goes beyond the law, in fidelity to ideals and always subject to the common good.

Eco-accounting proposes an ontological commitment to a change of focus from the quantitative to the qualitative to provide an accounting and rationale for these synchronicities that presuppose a new social order of accounting, reporting and rendering accounts of the patrimonial facets of our biodiversity. This change of perspective must inevitably affect our attitude toward accounting knowledge and promote the birth of the era of empathy, in the principles of eco-philosophy, that ecological wisdom that tends to the care and governance of the public, with a sincere and spontaneous attitude of its participants, to think and feel an accounting science with ecological awareness, as a path toward the general sublimation of human behavior in its highest ideals of common good. Quantity should not be the only criterion to measure and value social, intellectual and moral aspects of the patrimonial wealth which accounting studies. It is necessary to assume a more sensitive attitude before the qualitative aspects of life, from an accounting point of view. Social agents in the accounting field must be more receptive to the qualities of the ancestral wisdom of the original peoples. Such is the challenge of new emergences such as social accounting, bio-accounting (Mejía, Serna, 2019), and economic accounting, in the context of the three-dimensional theory of accounting..." (Suárez et al., 2020, p. 128).

5. Morales and Estrada (2020, p. 76, 79) propose "to encourage the emergence of an environmentally conscious accounting culture", where "eco-philosophy is the essential ontological commitment to eco-accounting, the mother science of accounting".

Eco-accounting proposes an ontological commitment to a change of emphasis from the quantitative to the qualitative to give to the accounting and a reason for these synchronicities that presuppose a new social order of accounting, reporting and rendering accounts of the patrimonial facts of our biodiversity. This change of emphasis must inevitably affect our attitude toward accounting knowledge and promote the birth of the era of empathy, in the principles of eco-philosophy, that ecological wisdom that tends to the care and government of the public, with a sincere and spontaneous attitude of its participants, to think and feel, an accounting science with ecological awareness, as a path toward the general sublimation of human behavior in its highest ideals of the common good (Morales, Estrada, 2020, p. 89).

6. Álvarez, Bedoya, Franco and Sanchez (2020)

Under the banner of a political philosophy of science, of a militant and socio-environmentally committed epistemology, from the theoretical frameworks of southern epistemology, the authors propose to unveil the hidden interests that accounting has had, as well as to establish new values and accounting intentions, anchored in the defense of the public, the general interest, in the path of the common good. This contribution applied to eco-accounting places the subject within reality, that is, the subject is part of reality.

Contrary to realism, reality is not outside the subject's skin, as the subject is within the system, while the eco-accounting is the materialization of the care of the house by the subject. Eco-accounting intends to satisfy the subjects' general needs without exceeding the limits that allow their regeneration (Álvarez et al., 2020, p. 14). Three-dimensional accounting theorists recognize that the social researcher is not neutral, on the contrary, he is an active militant and protagonist of social change, who studies reality to transform it and not only describe it; accounting is a moral knowledge.

Eco-accounting establishes as a formal object the care of the *oikos* or house, mediated by the man-nature relationship, from the perspective of wealth control, where the bases for the study of eco-accounting are supported in scientific constructions as the bio-accounting in its own theoretical context of three-dimensional accounting. This constitutes a landmark in the theoretical construction of militant knowledge committed to future generations, through a vision different from the economic one, which in accounting historically was servitude. (Álvarez et al., 2020, p. 30). The authors' vision implies an accounting decolonization from the economic subordination to which it has been historically subjected.

Expectations and challenges of eco-accounting: conclusion

The formulation and consolidation of eco-accounting as a conscious and socially committed knowledge, implies a theoretical, conceptual and procedural foundation of accounting knowledge and activity, which must be formulated in dialogue with the currents of post-development and alternative discourses, both coming from the global north (decrease, ecological economy, bio-economy, the great turn, the economy of the common good, the great initiative for transition, the formulation and explanation of the Anthropocene), as well as the proposals of the global south (we are witnessing an era of transitions in all fields, leading to post-extractivism, development alternatives, accounts of civilizational crisis, modernity alternatives, the logic of the communal, relationality and the pluriverse) (Escobar, 2016, p. 38).

Eco-accounting surpasses, overflows, subsumes accounting and its disciplines, bio-accounting, socio-accounting, economic accounting, cultural accounting, ethno-accounting, even purely venal accounting systems; because of the integrating vision it does not create a patrimonial fragmentation, it is an inclusive conception, an integration of coexistence, it is a recognition of the pluriverse, in which the bio-physical, human and natural worlds are not established as separate entities, but with a constant continuity (Escobar, 2016, p. 58; Farhad, 2012, p. 268).

Eco-accounting is more than semantic displacements and terminological emergences, it is a space of convergence of worldviews, cosmologies, cosmogonies, ontologies, epistemologies, methodologies, mobilizations, consensus and

dissent that discuss, project and evaluate the role of organizations in nature in the face of dignified life. The transition from financial accounting as a single language is the overcoming of monism toward the divergent coexistence of multiple forms of representation of wealth and organizational impacts, in order to recognize the role of accounting in the public rendering of diverse accounts. Accounting for life and sustainability must build a new lexicon, a new grammar in terms of life, since the existing one is based on waste, consumption, market and business profits.

Multidimensional accounting explores plural cognition, diverse desires, dissimilar dreams, multiple objectives that characterize human beings; life is not one-dimensional, nor can accounting be. The new challenges demand new theories, concepts and procedures such as: measurement in physical units, intrinsic ecological valuation, supply-nature relationship, social demand, integral cost and profit, socio-ecological systems, economy-nature relationship, interrelated stocks and flows of wealth, calculation of total impact, multiple connections and correlated systems.

The rise of new theories demands social, moral and ethical validation; the necessary transition from *homo economicus* to *homo ecologicus* is recognized, a proposal of multiple centers against the traditional economic centrism, recovery and valuation of the local and the ancestral. It must be acknowledged that language not only represents reality, but also constructs it; it is not a model for replicating existence, but for establishing new interpretations in terms of desirable futures. The new knowledge is framed in emergencies such as: relationality, disruption, subjectivity, uncertainty and probability. The opportunity to think about a better world has been supplanted for the moment by the concept of building a sustainable world based on life worthy of all forms of existence. Eco-accounting is a small contribution toward that end.

Bibliography

Álvarez, H. (2019). Buscando la ruta de la medición-valoración ecológica no monetaria, en la Teoría Tridimensional de la Contabilidad. *Revista Visión Contable*, 20, 22–95.

Álvarez, H. (2020). Una aproximación al reconocimiento, medición y valoración de la riqueza patrimonial a la luz de la eco-contabilidad (teoría tridimensional de la contabilidad-T3C). *Revista Identidad Bolivariana*, Vol. 4, No. 1, 101–113.

Álvarez, H., Bedoya, A., Franco, D. (2020). Eco-contabilidad, Propuesta para la fundamentación teórica de la T3C. Cali: Universidad Libre (en edición).

Escobar, A. (2016). Sentipensar con la tierra. Nuevas lecturas sobre desarrollo, territorio y diferencia. Medellín. Ediciones UNAULA.

Farhad, S. (2012). Los sistemas socio-ecológicos. Una aproximación conceptual y metodológica. Memorias de las XIII Jornadas de Economía Crítica (Sevilla-España).

Francisco, S. (2015). Laudato SI, Sobre el cuidado de la casa común. Bogotá: San Pablo.

Franco, D. (2019). Hacía unos fundamentos ontológicos de la Eco-contabilidad (Trabajo de grado Maestría en Contabilidad). Bogotá: Universidad Libre de Colombia.

Fuentes, J., Peña, F. (2016). Un intento de reconstrucción de la contabilidad del chamán Makuna que habita en las selvas del Vaupés en la Amazonia colombiana. *Rev. Cient. Gen. José María Córdova*, 14(17), 285–346.

Mejía, E. (2019). Reportes organizacionales no financieros y biocontabilidad: superando la contabilidad ambiental. *Revista Visión Contable*, No 20, julio-diciembre, 97–120.

Mejía, E., Serna, C. (2019). Tránsito de la contabilidad convencional a la biocontabilidad. Cali: REDICEAC.

Morales, G., Estrada, S. (2020). Ecosofía contable: propuesta para la emergencia de una cultura contable con conciencia ecológica en Colombia. *Revista internacional de contabilidad y auditoría (Legis)*, 83, 59–98.

Suárez, J., Cárdenas, M., Méndez, V., Rojas, L., Castillo, I., Wilches, C., Contento, L., Varela, J. (2020). Cuentas y cuentos… cuidad de las cuentas públicas: custodia de la probidad. Bogotá: FUSM-CGN.

Abstract

Eco-accounting: a Vision for "the Care of the Common Home" from the thought-feeling perspective

The Multidimensional Accounting Theory MAT states that informed account studies all types of wealth controlled and affected by an organization. The research in the framework of a dialogue of knowledge has allowed advances in the development of accounting systems for the environmental (bio-accounting), social (socio-accounting) and economic (economic accounting) sectors that constitute three-dimensional accounting, which will be extended to new dimensions (four-dimensional, penta-dimensional...), depending on the theoretical, conceptual and procedural development of such dimensions (cultural, ethnic, indigenous, etc.) Some accounting theorists have conceptually grouped all the accounting dimensions and their relationship with the universe of knowledge under the term of eco-accounting, which is addressed in this document, in reference to a contextualized and correlated body of knowledge that integrates the reality of accounting and its potential within the framework of sustainability. This is conceived of as a guiding vision of a new relationship of man with nature, based on respect for ecosystems and protected by the principle of defending life in conditions of dignity and continuity for all expressions of existence, under a criterion of intra- and inter-generational responsibility, in the broadest spatial-temporal spectrum of respect and protection of the common home.

Keywords: bio-accounting, environmental accounting, eco-accounting, thought-feeling, socio-accounting, sustainability

Ecosystem services as determinants of poverty

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1. Introduction

Traditionally and extensively, economic growth has been considered the key to obtaining results in reducing poverty, but the increase in aggregate production by itself is not enough to achieve it, and even less if this growth is accomplished by sacrificing the sustainability represented in natural system quality, equality of income, and social justice. However, this approach continues to predominate in developing countries when conceiving their plans, programs and public policies, so that the concept of "grow (pollute) first, clean up later" is the *modus operandi* of most countries in the world that have provoked and continue to cause serious impacts on the sustainability of the planet, predating nature, causing high levels of pollution and disastrous effects on the human race, by aggravating patterns of inequality, inequity, marginalization and misery (Urquidi, 1999; Liu, 2010b; Yang, 2007). Specifically, with respect to the quality of the natural environment, as expressed by Nixon (2011), environmental degradation constitutes a "slow violence" that is produced by humanity and causes extremely hazardous effects concerning its level of well-being with two aggravating factors: the first is a violence that affects the poor more intensely because they have fewer opportunities to adapt, and the second factor is practically imperceptible as it occurs gradually and is dispersed in time and space (Nixon, 2011).

Interest in environmental issues at the international level was introduced by the United Nations–UN at the Stockholm, Sweden conference in 1972, and continues to raise awareness about the unsustainability of the current development model, which does not guarantee life and rights of people or the planet. In 1987 the term "sustainable development" was coined in the Report "Our Common Future" of the World Commission on Environment and Development, which means the condition is attributed from sustainability to the progress of the countries. In this sense, the notion of sustainability becomes

a condition that completely modifies the way in which economic growth was conceived at a global level until then (World Commission on Environment and Development of United Nations, 1987; Gómez de Segura, 2014).

Within the framework of the SDG Sustainable Development Goals established in the 2030 Agenda signed by the UN Member States in 2015, environmental sustainability is conceived as the key to promoting inclusive sustainable development in the world. Inference resulting from recognizing that 86 of the 169 targets set in the SDGs directly links environmental elements with poverty, hunger, social protection (health–education–gender), water, basic sanitation, energy, economic growth, human settlements, sustainable consumption, sustainable production, climate change, oceans and terrestrial ecosystems – all aspects that are fundamental and decisive at the moment of conceiving society's well-being. In other words, from the framework of sustainable development, environmental sustainability implies not only the reduction of damages and negative impacts of anthropogenic activities on the environment, but also "the role of natural resources and ecosystem services in human well-being, economic opportunities and social and ecological resilience" (United Nations Development Program UNDP Colombia, 2020).

Since the Brundtland Report and regarding the SDGs, there have been numerous investigations that attempt to clarify the characteristics, the real situation of each of the areas of sustainable development and the interrelationships between society, environment and economy. Specifically, with respect to environmental sustainability, there are several authors who encourage in their publications to consider the conditions of natural capital and ecosystem services as explanatory and decisive elements of poverty, exclusion and social marginalization that humanity faces today (Rockström et al., 2015; Zhang et al., 2015; Gonzáles de Olarte, 1997). However, much progress remains to be achieved in studying the interrelationships between social and environmental dimensions, specifically related to the relationship and interaction among conditions of natural environment–environmental dimension–and situations of poverty and social marginality, two of the most serious problems of social dimension that are currently experienced and on which actions should be promoted (Meynard, Hajek, 1999).

In this direction, by proposing a scientometric study for the last ten years, which allows us to review the way in which the scientific community has thought about and linked ecosystem services with poverty, this paper aims, on one side, to contribute elements from the environmental dimension of sustainable development, so that future research can re-signify the notion of poverty from the articulation of all dimensions of sustainable development; and on the other, point out possible alternative lines of research concerning the analysis of the multidimensionality that determines people's poverty condition. It highlights the idea that, from the authors' perspective, sustainable development framework provides the notion of poverty with the approach that is required to address this social problem from its own complexity; which,

in turn, allows public and private actions to reduce, mitigate or eliminate it, to be more effective when considering the real needs of people living under this condition.

2. Scientometrics to address ecosystem services as determinants of poverty

Understanding scientometrics "the quantitative analysis of scientific production (especially scientific articles) to investigate development, structure, dynamics, trends and relationships of scientific practice" (Michan, Muñoz, 2013), one should bear in mind that in the case of social sciences, instead of scientometrics, there is a systematic literature review. Scientometrics or systematic literature review, is an analysis that allows identifying trends in the study and the approach that has been used to a particular topic in articles published in scientific databases over a period of time. For the specific interests of this study, the review is an analysis that allows us to examine, evaluate and compare what has been reflected in scientific articles published in recent years, regarding the articulation of ecosystem services with the notion of poverty. Therefore, conceiving poverty within the framework of sustainable development, the systematic literature review that is proposed provides evidence on the way in which ecosystem services operate as an analysis variable that represents the environmental dimension of sustainable development. A representation that is of vital importance, considering that, only when poverty is addressed from its complexity, it shall be possible to abolish this problem of the human condition.

The object of analysis for the processing of electronic literature is constituted by scientific publications of the last ten years related to the subject of study. The methodological process of the systematic review consists of four consecutive phases, such as: planning, search–selection, analysis, and construction of the report of the Systematic Literature Review; such methodological process represents an adaptation to the methodological process proposed by the CetiSME Consortium that was reflected in the document "Economic and Technological Intelligence. Guide for beginners and professionals" (Araujo Ruiz, Ricardo Arencibia, 2002; Gómez Meza, 2014; CetiSME, 2002). An explanation what each of the phases consists of and how they are operationalized in order to achieve the purposes of this article is briefly explained below.

Phase 1. Planning. To specify and delimit the systematic review, criteria are defined that result from the preliminary exploration of the topic of interest, criteria that in turn become descriptors and keywords, on which the search for scientific articles in databases carried out in the next phase of the methodological process is based. In this study the authors narrowed down nine (9) keywords: "ecosystem services", "cultural services", "regulation services", "support services", "utilization services", "poverty", "Low Quality of Life", "Inequality", "inequity". Descriptors that are derived from the two main

categories of analysis of the present study and the importance and hierarchy of these keywords were validated by a panel of experts, made up of seven researchers in social and environmental sciences.

Phase 2. Search and selection of scientific information. It begins with an unstructured search on the web once the sources of information and databases that will be considered for the review are identified; this preliminary search allows to refine the subject and then proceed to structure the search equation for information analysis. For the purposes of this study, Scopus database is chosen to perform scientometrics or systematic literature review, as it is a database of textual quotations and abstracts of published scientific articles, which enjoys a high prestige and recognition within the academic and scientific community, since its indexed content comes from more than 5,000 publishers around the world; it contains more than 75 million publications, 24,600 active titles, more than 20,000 peer-reviewed journals, of which about 20% are open access; all these aspects make Scopus a base that combines quality content with tools that allow the use, analysis and management of the contents of the publications (Elsevier, 2020).

Using Boolean operators to combine keywords, search equations were designed in Scopus, applying the period between 2010 and 2020 as a selection criterion for the analysis of scientometric indicators, since in this period about 60% of publications are on the topic of interest; and for in-depth analysis, only documents with more than 50 textual quotations are selected within the search results, considering those with the greatest impact on the scientific community. The study of technological surveillance and the analysis of scientometric indicators is carried out from 733 results that gives the following search equation: TITLE-ABS-KEY (“ecosystem services”) OR TITLE-ABS-KEY (“cultural services”) OR TITLE-ABS-KEY (“regulation services”) OR TITLE-ABS-KEY (“support services”) OR TITLE-ABS-KEY (“utilization services”) AND TITLE-ABS-KEY (“poverty”) OR TITLE-ABS-KEY (“Low Quality of Life”) OR TITLE-ABS-KEY (“Inequality”) OR TITLE-ABS-KEY (“inequity”) AND DOCTYPE (ar) AND PUBYEAR>2009 AND PUBYEAR<2021.

Phase 3. Information Analysis. With the results obtained in the previous phase, two types of analysis are carried out: the first is a statistical analysis, which perceives the analysis of scientometric indicators related to the number of scientific publications, institutions, researchers and the most distinguished countries in publishing on the study topics; this analysis is carried out on the 733 search result articles: the second, an in-depth analysis that allows foresight generation to visualize the main trends on the subject. The list of documents on which the in-depth analysis is carried out considers the articles with fifty or more textual quotations, which in turn are debugged using the coding proposed by David Whetten, by selecting the articles that provide answers to “what”, “how”, “why” or “who/where/when” of the relationships or links between ecosystem services and poverty (Whetten, 1989). The in-depth analysis for 93 scientific articles is initiated.

Phase 4. Systematic Literature Review Report. In this fourth and last phase of the methodological process, the report that allows the dissemination of the results of scientometrics or systematic review is developed, through which recurring themes related to: backgrounds, dimensions, mechanisms–mediators, consequences and foresight of the subject of study are reflected. The report also presents trends in terms of possible lines of research that can be addressed to advance knowledge of the topic of interest. The results of the review report proposed in this article are presented in the following section of the article.

3. Discussion and results

Statistical analysis from scientometric indicators

Evolution of publications

In the last ten years, it has been observed that a growing number of researches tend to establish links between ecosystem services and poverty – research interests that translate into an increasing trend for the number of publications. From 2010 to 2020, a total of 733 publications were registered on the subject of study; in 2019 alone, 105 scientific articles were registered, since this period becomes the highest inflection point within the trend (Figure 1). The boom in the analysis of ecosystem services in relation to poverty shows a high degree of interest on behalf of academic institutions and multilateral organizations to clarify the link that exists between these two categories of analysis.

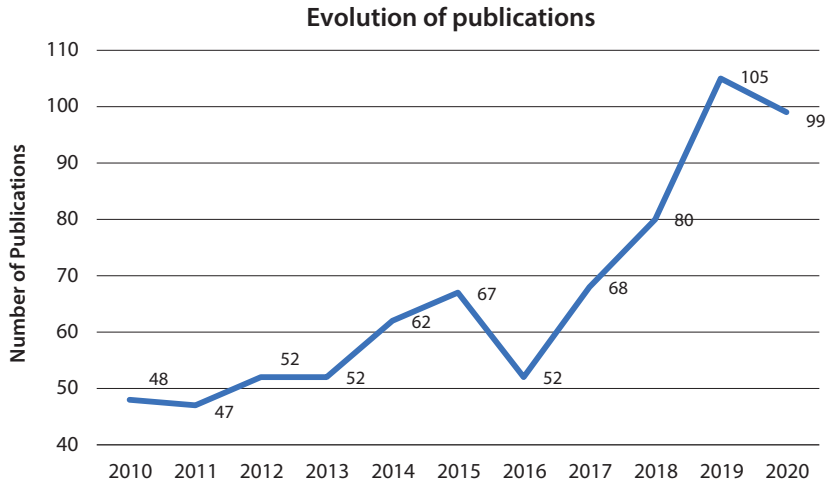


Figure 1. Evolution of scientific papers on ecosystem services and poverty

Source: Authors' elaboration, based on information from Scopus

Representative institutions

At a global level for the period of analysis, among universities, research centers and multilateral organizations, 160 institutions contributed to the research aimed at establishing links between ecosystem services and poverty. It should be highlighted that 3% of the institutions contribute to10% of the publications in absolute terms, which is to say that five institutions have published 94 scientific articles between 2010 and 2020 (Table 1).

Table 1. Publications on ecosystem services and poverty by institution

Number of publications by institution, 2010-2020	Number of institutions	
20 or more publications	2	1%
15-19 publications	3	2%
10-14 publications	11	7%
5-9 publications	67	42%
4 publications	46	29%
3 publications	31	19%
Total Institutions	**160**	**100%**

Source: Authors' elaboration, based on information from Scopus

Within the statistical analysis of the scientometric indicators of the representative institutions, it has been found that thirteen (13) universities, two (2) research centers and one (1) multilateral organization, which represent 10% of the 160 institutions, have produced 24% of the scientific publications that have been generating contributions to the subject of study. From this group, the most representative ones by having the largest number of publications up to 2020 are: Chinese Academy of Science with 27 articles and Stockholms Universitet with 20 publications (Table 2).

There are several high impact products that have been published with the affiliation of the Chinese Academy of Science, among the most cited are the following: improvements in ecosystem services from investments in natural capital (455 textual quotations); extending the timescale and range of ecosystem services through paleoenvironmental analyzes, exemplified in the lower Yangtze basin (107 textual quotations); global importance of large-diameter trees (89 textual quotations) and poverty alleviation strategies in eastern China leading to critical ecological dynamics (53 textual quotations). These are the articles that refer to the need to consider natural capital and ecosystem services when making decisions in favor of sustainability, decisions that mean actions from public and private sectors to promote changes in favor of well-being for present and future generations, represented in the reduction of poverty, sustainable levels of growth and consumption, sustainable

Table 2. Institution ranking of publications on ecosystem services and poverty

Institution's name and country	Number of publications
Chinese Academy of Sciences, China	27
Stockholms Universitet, Stockholm	20
Wageningen University & Research, Netherlands	16
Stanford University, United States	16
University of East Anglia, United Kingdom	15
University of Southampton, United Kingdom	13
James Cook University, Australia	12
University of Oxford, United States	12
The University of Edinburgh, United Kingdom	12
McGill University, Canada	11
Harvard University, United States	11
University of Leeds, United Kingdom	11
University of Toronto, Canada	11
Nature Conservancy, TNC (non-governmental environmental organization)	11
Center for International Forestry Research, West Java-Indonesia	11
Michigan State University, United States	10

Source: Authors' elaboration, based on information from Scopus

productive activities, among others (Ouyang et al., 2016; Dearing et al., 2012; Lutz et al., 2018; Zhang et al., 2015). Chinese Academy of Science is also the institution with the most documents in Scopus that have tried to link poverty with sustainable development (Orjuela, Ramírez, 2020). Therefore, it is a scientific society and a comprehensive research and development network, which comprises 104 research institutes, 12 affiliate academies, 3 universities and 11 support organizations with a broad presence nationwide and which stands out in the international scientific field today for its valuable contributions and leadership, when it comes to understanding poverty from its complexity from a multidimensional approach.

Leading authors on the subject

The production generated by 83% of the authors who have been investigating the relationships or links that exist between ecosystem services and poverty, consists of the writing and publication of two or three scientific articles in the last ten years. The other authors in the same period have published between 4 and 7 scientific articles (Table 3).

Table 3. Publications on ecosystem services and poverty, by author

Number of papers by author	Number of publications	
	Number of authors	Percentage of the total
7 papers*	2	1%
6 papers	6	4%
5 papers	3	2%
4 papers	16	10%
3 papers	45	28%
2 papers	88	55%
Total Authors	**160**	**100%**

* Note: Gretchen C. Daily at Stanford University from the United States, and Cong Li at Xi'an Jiaotong University from China.

Source: Authors' elaboration, based on information from Scopus

Among the 160 authors that are registered in the search results, Gretchen C. Daily, attached to Stanford University in the United States, stands out with publications related to natural capital and the valuation of ecosystem services as strategies to promote and strengthen sustainable development. Daily is a researcher with an extraordinary h-index of 79, an index that reflects its important scientific production, regarding quantity and quality (textual quotations received) and is a co-author of the article *Improvements in Ecosystem Services from Investments in Natural Capital*, mentioned in the previous section as the document with the highest number of textual quotations (Ouyang et al., 2016; Li, Feldman, Li, Daily, 2011; Guerry et al., 2015).

On the other hand, considering the number of Cong Li's publications on the subject of interest during the period of analysis, it also stands out that she is affiliated with the University of Xi'an Jiaotong of China, a university that is part of the society of knowledge conformed by Chinese Academy of Science. Li, as well as Daily, has contributed elements of analysis and evidence that link ecosystem services with the reduction of ecological pressure at a local level and with improvements in human development (Li et al., 2015; Li et al., 2019).

Countries of origin of the publications

In the analysis of the scientometric indicators, it is possible to identify that scientific articles have been produced and published by 97 countries around the world. It has been observed that the United States is the country with the highest number of publications in Scopus (227) during the study period, followed by the United Kingdom (158) and China (87). In addition, ten countries originate about 70% of the scientific production that links environmental services with poverty in some way (Figure 2).

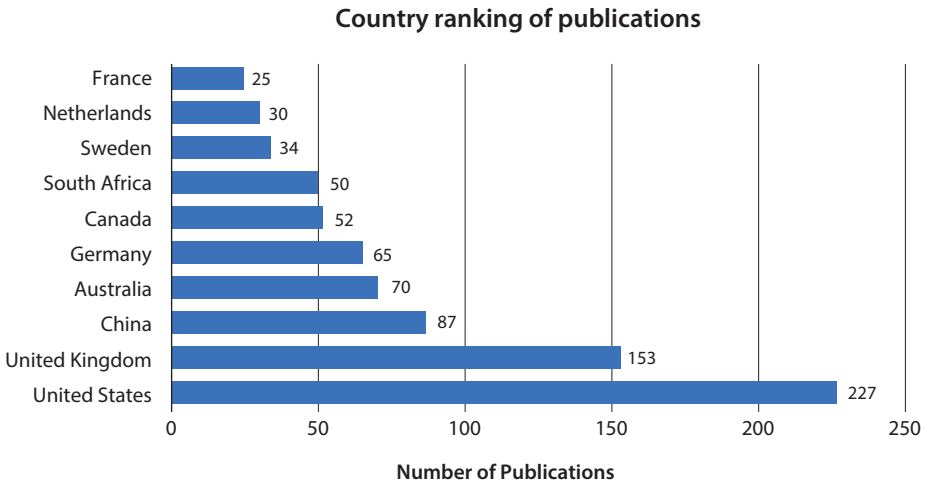


Figure 2. Publications on ecosystem services and poverty by country

Source: Authors' elaboration, based on information from Scopus

Meanwhile, Colombia contributes twelve publications in the area of interest between 2010 and 2020, with one of the articles listed as the most quoted in the initial part of this section of this article. This is a study that integrates the results of a global analysis that seeks to establish, on the one hand, the contribution of large trees to the density, richness and biomass of forests, and on the other, to the conservation of the ecosystem services regulating these natural systems. In this study, el Instituto Amazónico de Investigaciones Científicas Sinchi [the Amazonian Institute of Scientific Research Sinchi], based in Bogotá, and the Department of Forest Sciences at Universidad Nacional de Colombia [National University of Colombia], based in Medellín, participated representing Colombia; and the findings provide evidence on the importance of natural capital management to conserve and enhance ecosystem services, which are fundamental to well-being of humankind (Lutz et al., 2018).

In-depth analysis

As part of the results of the systematic literature review proposed in this paper, regarding articles exploration in Scopus that have sought to articulate ecosystem services with poverty in the last ten years, this section presents the cluster analyses obtained from VOSviewer, a free-to-use software tool for building and visualizing bibliometric networks to analyze scientific literature.

In VOSviewer the concurrency neural network analysis represents the coincidence and interconnection of important terms that are extracted from scientific literature that was selected for the study, in this particular case, from the scientific production that has been developed in an attempt to articulate ecosystem services and poverty. In Figure 3 it can be seen that the terms

of ecosystem services, poverty reduction and poverty, in addition to being the largest nodes, are relatively close to and in the center of the neural network, characteristics that denote the connection and importance of these categories within the 93 published scientific articles that are the object of study in this in-depth analysis.

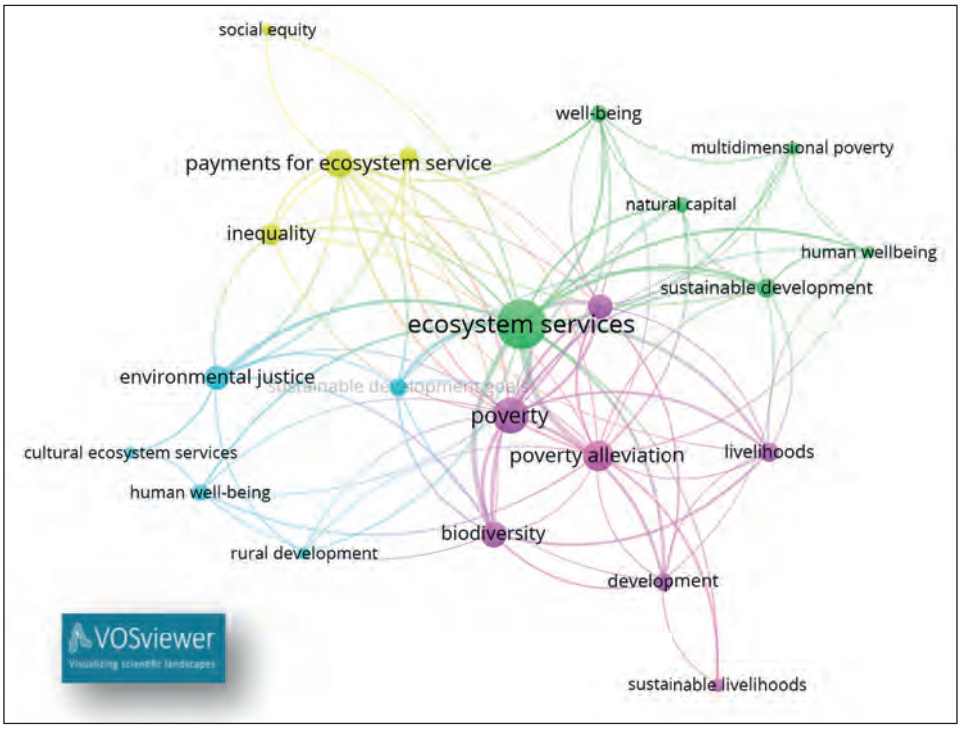


Figure 3. Neural network of keywords

Source: Authors' elaboration of VOSviewer based on information from Scopus

The topic with the greatest number of publications, due to the size of the node in the neural network, is that of ecosystem services, a term that is part of the green cluster made up of words that are related to inclusive sustainable development, from which the value of natural capital to achieve social welfare and environmental sustainability is recognized. In order of importance by the size of the nodes, there is the purple cluster whose central axes are poverty and the goal of shrinking it as a society, a purpose provided by sustainable development from the multidimensional perspective; it will only be abolished from human condition to the extent that environmental sustainability strategies are conceived and promoted.

The third cluster is the yellow one, whose central node is payment for environmental services; as it is interpreted from the words it links, it constitutes a strategy to promote social and environmental equity. Finally, the

blue cluster that focuses on the keywords Sustainable Development Goals and environmental justice; it brings together elements that reflect changes that are achieved in people's well-being, by recognizing and valuing cultural services, regulation, exploitation and sustainability provided by nature.

Finally, as a complement to the interpretation that has just been made, research trends with which links between ecosystem services and poverty are established; a brief description of the general areas of work of the community, a scientific research regarding this articulation, lines of research that are identified from the detailed review of the publications selected for this in-depth analysis is presented below.

Sustainable management of natural capital and ecosystems, from public policies and/or private initiatives, which allow improving or enhancing ecosystem services for conservation and environmental sustainability, reducing poverty and achieving sustainable development (Hanauer, Canavire-Bacarreza, 2015; Lutz et al., 2018; Ouyang et al., 2016; Díaz et al., 2015; Zhang et al., 2015; Li et al., 2015; Laterra et al., 2019; Dearing et al., 2012; Rockström et al., 2015; Schreckenberg, Mace, Poudyal, 2018; Rubiano, 2019; Marshall et al., 2018), and in turn, assertive decision making on land use (Goldstein et al., 2012; Li et al., 2020; Li et al., 2017; Li, Feldman, Li, Daily, 2011).

Analysis and reflections concerning the importance of valuing environmental services to address environmental justice problems, improve people's well-being, and obtain inclusive sustainable development (Escobedo, Clerici, Staudhammer, & Tovar, 2015; Díaz, et al., 2018; Costanza et al., 2017; Zheng et al., 2019; Villamagna, Mogollón, & Angermeier, 2017; Cook, Fisher, Tiemann, Tassilo, & Vidal, 2011; Li et al., 2019).

Payments for ecosystem services as a strategy for conservation and environmental sustainability, on the one hand, and to reduce poverty, on the other; this second articulation is vastly relevant for the research interests of the authors of this paper (Moros, Corbera, Vélez, & Flechas, 2020; Ren, Li, Li, Li, & Daily, 2018).

4. Final remarks

Ecosystem services understood as benefits received from nature, represented in support or maintenance services, supplying services, regulation services and cultural services are established in a framework of analysis and a common language that allows to make approximations on the way in which sustainable and inclusive management of ecosystems promotes changes in people's well-being. To this effect, for instance, through trade-offs and synergies between rural livelihoods and urban demand for ecosystem services, it is possible to reduce poverty and contribute to social and environmental justice. Hence, as a result of the review of multiple studies that have been referred to throughout this article, it is possible to show that ecosystem services largely represent aspects

of environmental dimension that determine living conditions of people and therefore, they certainly can be considered as determining factors behind the poverty of people.

The quantity and dynamics of the studies that were reviewed for the preparation of this paper, studies that seek to understand the relationship between ecosystem services and well-being of human beings, show that it is a flourishing research area that has at least three major trends or lines in which this articulation has been thought, such as sustainable management of ecosystem services, payment for ecosystem services, and valuation of ecosystem services. Results of the scientometric analysis show the growing interest of the scientific community in finding ways and strategies that allow the sustainable management of natural capital and ecosystems as a path to achieve significant improvements in people's well-being and alleviate or even abolish the poverty of the human condition. On the other hand, these results express the latent need that we have as a society to consolidate global environmental awareness, which allows through different governance schemes in the management and administration of ecosystem services to achieve sustainable human well-being with equity, diversity and resilience. This means, from the authors' point of view, that proper management of ecosystem services is a guarantee of environmental sustainability and social well-being associated with inclusive sustainable development.

The results of the systematic literature review shown in this article, constitute the basis for perceiving ecosystem services as determinants of the poverty condition of a population, since they manage to show that these benefits that nature provides affect in one way or another people's well-being. Therefore, ecosystem services operate as the category of analysis from the environmental dimension that is needed for the multidimensional approach required to understand poverty from the framework of sustainable development; it is supported by the authors' strong belief that poverty will be abolished from human condition, only when this social problem is addressed from its complexity. The next stage to be developed in future research is to identify and select the specific variables within the ecosystem services that best represent the optimal conditions that natural capital must have to guarantee well-being of human beings and, at the same time, environmental sustainability of planet Earth.

Bibliography

Araujo Ruiz, A., & Ricardo Arencibia, J. (2002, julio–agosto). Informetrics, bibliometrics and scientometrics: theoretical-practical aspects. *ACIMEN, 10*(4).

CetiSME (2002). Economic and Technological Intelligence. Guide for beginners and professionals (ed. European Communities). European Community of Nations: European Communities.

Cook, S., Fisher, M., Tiemann, Tassilo, & Vidal, A. (2011, January 20). Water, food and poverty: global- and basin-scale analysis. *Water International, 36*(1), 1–16.

Costanza, R., de Groot, R., Braat, L., Kubiszewski, I., Fioramonti, L., Sutton, P., Grasso, M. (2017, December). Twenty years of ecosystem services: How far have we come and how far do we still need to go? *Ecosystem Services, 28*(Part A), 1–16.

Dearing, J.A., Yang, X., Dong, X., Zhang, E., Chen, X., Langdon, P.G., Dawson, T.P. (2012, May 1). Extending the timescale and range of ecosystem services through paleoenvironmental analyses, exemplifiedin the lower Yangtze basin. *Proceedings of the National Academy of Sciences of the United States of America, 109*(18), E1111--E1120.

Díaz, S., Demissew, S., Carabias, J., Joly, C., Lonsdale, M.L., Ash, N., Fi. (2015, June). The IPBES Conceptual Framework – connecting nature and people. *Current Opinion in Environmental Sustainability, 14*, 1–16.

Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R.T., Molnár, Z., Leadley, P.W. (2018, January 19). Assessing nature's contributions to people. *Science, 359* (Issue 6373), 270–272.

Dubbeling, M., Santini, G., Renting, H., Taguchi, M., Lançon, L., Zuluaga, J., Andino, V. (2017, agosto). Assessing and Planning Sustainable City Region Food Systems: Insights from Two Latin American Cities. *Sustainability, 9(8)*, 1455.

Elsevier (2020). *Scopus*. Retrieved from https://www.scopus.com/: https://www.elsevier.com/solutions/scopus?dgcid=RN_AGCM_Sourced_300005030.

Escobedo, F.J., Clerici, N., Staudhammer, C.L., & Tovar, G. (2015). Socio-ecological dynamics and inequality in Bogotá, Colombia's public urban forests and their ecosystem services. *Urban Forestry & Urban Greening, 14*(Issue 4), 040–1053.

Goldstein, J.H., Caldarone, G., Duarte, T.K., Ennaanay, D., Hannahs, N., Mendoza, G., Daily, G.C. (2012, May 8). Integrating ecosystem-service tradeoffs into land-use decisions. *Proceedings of the National Academy of Sciences of the United States of America – PNAS, 109*(Issue 19), 7565–7570.

Gómez de Segura, R.B. (2014). From sustainable development according to Brundtland to sustainability as biomimetrics. Bilbao, España: Publicaciones Hegoa.

Gómez Meza, M. (2014). Technological surveillance and competitive intelligence model. Manizales.

Gonzáles de Olarte, E. (1997). Environment and poverty in Peru. Lima: Institute of Peruvian Studies.

Guerry, A.D., Polasky, S., Lubchenco, J., Chaplin-Kramer, R., Daily, G.C., Griffin, R., Kareiva, P.M. (2015, June 16). Natural capital and ecosystem services informing decisions: From promise to practice. *PNAS, 112*(24), 7348–7355.

Hanauer, M.M., & Canavire-Bacarreza, G. (2015, November 5). Implications of heterogeneous impacts of protected areas on deforestation and poverty. *Philosophical Transactions Royal Society B, 370*(Issue 1681), 1–10.

Laterra, P., Nahuelhual, L., Vallejos, M., Berrouet, L., Arroyo Pérez, E., Enrico, L., Villegas-Palacio, C. (2019, April). Linking inequalities and ecosystem services in Latin America. *Ecosystem Services, 36*, 100875.

Li, C., Guo, M., Li, S., & Feldman, M. (2020, February 20). The Impact of the Anti-Poverty Relocation and Settlement Program on Rural Households' Well-Being and Ecosystem Dependence: Evidence from Western China. *Society and Natural Resources*.

Li, C., Kang, B., Wang, L., Li, S., Feldman, M., & Li, J. (2019, January 23). Does China's Anti-Poverty Relocation and Settlement Program Benefit Ecosystem Services: Evidence from a Household Perspective. *Sustainability, 11*(3), 600.

Li, C., Li, S., Feldman, M.W., Li, J., Zheng, H., & Daily, G.C. (2017, October 5). The impact on rural livelihoods and ecosystem services of a major relocation and settlement program: A case in Shaanxi, China. *Ambio, 47*, 245–259.

Li, C., Zheng, H., Li, S., Chen, X., Li, J., Zeng, W., Daily, G.C. (2015, June 16). Impacts of conservation and human development policy across stakeholders and scales. *PNAS, 112*(24), 7396–7401.

Li, J., Feldman, M.W., Li, S., & Daily, G.C. (2011, May 10). Rural household income and inequality under the Sloping Land Conversion Program in western China. *PNAS, 108*(19), 7721–7726.

Liu, L. (2010b, February 1). Made in China: Cancer Villages. *Environment: Science and Policy for Sustainable Development, 52*(Issue 2), 8–21.

Lutz, J.A., Furniss, T.J., Johnson, D.J., Davies, S.J., Allen, D., Alonso, A., Zimmerman, J.K. (2018, May 8). Global importance of large-diameter trees. *Global Ecology and Biogeography, 27*(7), 849–864.

Marshall, F., Waldman, L., Randhawa, P., Amerasinghe, P., Priya, R., Dolley, J., & Bisht, R. (2018). Ecosystem Services and Poverty Alleviation in Urbanising Contexts. Chapter 7. In: K. Schreckenberg, G. Mace, & M. Poudyal, *Ecosystem Services and Poverty Alleviation. Trade-offs and Governance* (1st Edition, p. 111–125). London: Routledge.

Meynard, C., & Hajek, E.R. (1999). Poverty and the environment in Latin America. *Person and Society*, 185-199. Retrieved from http://www.ecolyma.cl/documentos/pyma_al_99.pdf.

Michan, L., & Muñoz, I. (2013). Scientometrics for Medical Sciences: Definitions, Applications, and Perspectives. *Research in Secondary Education,* 100–106.

Moros, L., Corbera, E., Vélez, M.A., & Flechas, D. (2020, January). Pragmatic conservation: Discourses of payments for ecosystem services in Colombia. *Geoforum, 108*, 169–183.

Nixon, R. (2011). Slow Violence and the Environmentalism of the Poor. Cambridge, Massachusetts, and London, England: Harvard University Press.

Orjuela, A., & Ramírez, D. (2020, julio – diciembre). Notes on the notion of poverty from sustainable development. *Legal Magazine, 17*(2), 297–314.

Ouyang, Z., Zheng, H., Xiao, Y., Polasky, S., Liu, J., Xu, W., Daily, G.C. (2016, January 26). Improvements in ecosystem services from investments in natural capital. *Science, 352*(6292), 1455–1459.

Ren, L., Li, J., Li, C., Li, S., & Daily, G.C. (2018, June 5). Does Poverty Matter in Payment for Ecosystem Services Program? Participation in the New Stage Sloping Land Conversion Program. *Sustainability, 10*(Issue 6), 1888.

Ríos Osorio, L.A., Salas Zapata, W.A., & Manuel, O.L. (2012). Concepts associated with health from the perspective of sustainable development. *Saúde e Sociedade*, 735–746.

Rockström, J., Guerry, A., Polasky, S., Lubchenco, J., Chaplin-Kramer, R., Daily, G.C. (2015). Natural capital and ecosystem services informing decisions: From promise to practice. *Proceedings of the National Academy of Sciences*, 7348–7355.

Rubiano, K.D. (2019, julio-diciembre). Distribution of the green infrastructure and its thermal regulation capacity in Bogotá, Colombia [Distribución de la infraestructura verde y su capacidad de regulación térmica en Bogotá, Colombia]. *Colombia forestal, 22*(2), 83–100.

Sachs, J.D. (2012, junio 9). From Millennium Development Goals to Sustainable Development Goals. *The Lancet, 379*, 2206–2211.

Schreckenberg, K., Mace, G., & Poudyal, M. (2018). Ecosystem Services and Poverty Alleviation. Trade-offs and Governance (1st Edition). London: Routledge.

United Nations Development Program UNDP Colombia. (2020). Environment and sustainable development. Retrieved from PNUD Colombia: https://www.co.undp.org/content/colombia/es/home/climate-and-disaster-resilience.html.

Urquidi, V.L. (1999). Dimensions of sustainable development and the case of Mexico. *Demographic and urban studies,* 525–544.

Villamagna, A.M., Mogollón, B., & Angermeier, P.L. (2017). Inequity in ecosystem service delivery: socioeconomic gaps in the public-private conservation network. *Ecology and Society, 22*(1), 36.

Whetten, D. (1989). What Constitutes a Theoretical Contribution? *Academy of Management Review, 14*(4), 490–495. Retrieved from https://pdfs.semanticscholar.org/9e87/5fba9d9062417e201abfc07e196f7ea0505f.pdf.

World Commission on Environment and Development of United Nations. (1987). Report of the World Commission on Environment and Development: Our Common Future. General Assembly of United Nations, World Commission on Environment and Development. UN Documents.

Yang, S. (2007, July 30). Grow first, clean up later and the circular economy: China's moon is rounder? *Environmental Protection Channel, People's Net*.

Zhang, K., Dearing, J.A., Dawson, T., Dong, X., Yang, X., & Zhang, W. (2015). Poverty alleviation strategies in eastern China lead to critical ecological dynamics. *Science of the Total Environment, 506–507*, 164–181.

Zheng, H., Wang, L., Peng, W., Zhang, C., Li, C., Robinson, B.E., Daily, G.C. (2019, April 23). Realizing the values of natural capital for inclusive, sustainable development: Informing China's new ecological development strategy, *116*(17), 8623–8628.

Abstract

Ecosystem services as determinants of poverty

Based on the growing awareness of the importance of environmental sustainability to achieve inclusive sustainable development, this article aims to provide evidence regarding the links that exist between ecosystem services and poverty. The foregoing considers that these services provided by nature as elements of the environmental dimension of sustainable development constitute determinants of poverty, a condition that affects well-being of a large part of the population worldwide. Based on a systematic literature review, through scientometrics that follows four consecutive phases (planning, research, selection and analysis of scientific information, and identification of trends in the research areas of the subject matter), it was possible to examine, evaluate and compare the relationships that different authors, countries and/or institutions have established between ecosystem services and poverty during the last ten years of research. Results provide evidence for the impact of ecosystem services on people's well-being, and establish the basis for interpreting poverty from the environmental dimension. When perceiving ecosystem services as determinants of poverty, progress is made in the comprehensive reading that is needed to guide assertive private and public actions that allow for changes in the real situation of people who suffer this plight that greatly deteriorates their quality of life and level of well-being.

Keywords: Environmental dimension of sustainable development, ecosystem services, poverty, systematic literature review

Bio-accounting recognition approach of agronomic properties in *Brachiaria humidicola* pastures under a Silvopastoral System in the humid Amazon tropics

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1. Introduction

The traditional productive systems implemented in cattle operations are considered as great predators of natural resources. Their poor implementation result in processes of soil and pasture deterioration as well as loss of biodiversity. This has an effect on substantial future economic losses for the cattle farmers who implement these types of traditional productive systems. In this context, the management of agricultural companies and the availability of accounting information on the state of natural wealth can play a decisive role in the development of the sector, where there is a need to transform productive units towards highly profitable and sustainable models in the framework of a competitive market and increasingly demanding consumers in ecological aspects. Mejía & Serna (2015) propose bio-accounting as an emerging discipline oriented towards ecological sustainability, where economic-financial aspects should be at the service of nature and society.

It is very common to find among livestock farmers (cattle breeders) in the department of Caquetá, a lack of knowledge about the reality of their livestock enterprises. In Colombia, livestock farming is characterized by being an extensive-extractive activity with low levels of investment (Molina, Franco, 2011). Most of the pastures on the farms are of low quality, with obvious signs of degradation of the grasslands and soils (Acosta, 2017). The lack of entrepreneurial vision is one of the reasons; being a cattle farmer has become so systematic that the essence of this activity has been forgotten; the basis for production should be focused on two factors: genetics and food. These should be complemented in order to be efficient in terms of production, which implies that cattle farmers must focus first on the land rather than only on the cattle.

In this order of ideas, agriculture is the basis for all livestock activity, regardless of the production system adopted. The degradation of pastures in the humid tropics of the Amazon is related to overgrazing and the abuse of the carrying capacity of the pastures by the rancher. The degradation of pastures reduces the yields of animal production and increases the costs of production (Spain, 1991). The tool used by the farmer to determine the days of grazing and the number of animals per lot of livestock is based on a calculation made by simple observation of the person in charge, a tool that is not very technical and not recommended for use in agricultural enterprises (Ruiz, 2018). The rotation of pastures and management of grasslands is one of the most important practices that must be done on a cattle farm. The lack of an optimal assignment of paddocks (Molina, Franco, 2011) is one of the most relevant limitations in pasture management that cattle ranchers should consider in the country.

Not alien to the national productive dynamics, the cattle business has made use of inefficient technologies for more than 20 years without taking into account the specific conditions of the agro-ecosystem. This use has limited the productive potential of the herd and at the same time, it has generated ecological and economic problems, such as soil and pasture degradation, contamination of water sources, deterioration of forest areas and biological diversity, among others. Among the main causes of pasture degradation, Spain (1991b) points out the loss of fertility, legume-grass instability, lack of forest cover, soil compaction and erosion, and finally the presence of insects. In this context, there is a need to implement alternative livestock production systems, as well as an accounting information system to evaluate their impact on the availability of biomass and thus validate the system, which can be replicated both internally and in other nearby productive units.

2. Theoretical foundations

Tropical rainforests represent almost 25% of the total area of forest in the world (Maldonado, 2016). According to Aguayo (2019) this 25% includes: rain forests, lowland rain forests, evergreen forests, semi-deciduous rainforests, wooded lands and wooded savannas, in regions where the average annual rainfall is more than 1,000 mm. Barrientos (2020), on the other hand, more conveniently defines the general term tropical rainforest as inclusive of all forests comprised in the humid tropics where annual precipitation exceeds the amount of water lost through evaporation and transpiration. Despite their distribution, they support a large proportion of the total global diversity of plants and animals, they store much of the earth's carbon reservoir and are currently a major sink for carbon dioxide. The likely impact on tropical rainforests is currently unclear, with predictions ranging from small changes to widespread dieback and loss of biodiversity (Tacarpo, 2018).

According to FAO (2009), livestock is one of the main influences on environmental problems, mainly land degradation. The total area devoted to grazing is equivalent to 26% of the planet's glacier-free land surface, while the area devoted to fodder production represents 33% of the total arable land. Livestock production generates high deforestation in the sectors used for grazing, especially in Latin America where 70% of the land in the Amazon that was once forest has now been converted to pasture and fodder crops. Soil conservation methods, silvopastoralism, better management of grazing systems, the establishment of limits on uncontrolled burning by producers and the controlled exclusion of livestock from fragile areas are techniques used to avoid soil degradation.

In Colombia, extensive cattle ranching accounts for almost 60% of the country's deforestation (García, 2014). It is for this reason that the need to implement production alternatives that allow for the harmonization of cattle production must be faced to mitigate the negative environmental effects that arise from this activity. Silvopastoral systems are an alternative to face this phenomenon. Mahecha (2003) defines silvopastoralism as a livestock production system where woody perennials (trees and/or shrubs) interact with traditional components (herbaceous forage and animals) under an integral management system. It has been proposed, based on research results, as a sustainable production alternative that allows the reduction of the environmental impact of traditional production systems. This option seeks to guide the producer to new sustainable systems of production and that requires to be calculated for the control, evaluation, and management of natural wealth. The development of cattle production under silvopastoral systems brings different benefits to the production system, being reflected in the improvement of pastures, and animal wellbeing, among others. Montoya (2016) presents the benefits of trees as fodder modifiers under their influence and as fodder, as environmental modifiers for animals and animal production.

The *Humidicola* grass (*Brachiaria humidicola*) has been widely spread among the cattlemen of the country, mainly in the Llanos Orientales (Eastern Plains) due to its adaptation to conditions of acid soils and low fertility, dense cover, high carrying capacity and tolerance to excess humidity in the soil Rincón et al. (2018). Interesting attributes of this pasture are mentioned; however, some limitations in animal production have been determined in comparison with other grasses of the genus *Brachiaria*. The *Brachiaria humidicola* grass grows well from 0 to 2000 meters above sea level in areas with rainfall ranges from 500 mm to 4000 mm, performing well in a diversity of soils ranging from sandy to clay. In search of increasing dairy and beef productivity, associations of humidified Brachiaria grass with legumes compatible with pasture are made (Pérez, Lascano, 1992, p. 1).

It is evident that the *Brachiaria humidicola* pasture yields a lower percentage of raw protein compared to grasses of the genus *Brachiaria*. For this reason, it is proposed that the association with legumes adapted to it and contributing to

Table 1. Raw protein content and digestibility of dry matter of different grasses of the genus *Brachiaria* in foothill soils of the Colombian's eastern plains

SPECIES	Age of regrowth	Raw protein	Digestibility
	days	%	%
Brachiaria humidicola	35	7.1	56.9
Brachiaria decumbens	35	8.6	61.5
Brachiaria brizantha	35	10.0	61.8
Brachiaria ruziziensis	35	11.2	65.5
Brachiaria dictyoneura	35	8.6	59

Source: Pérez & Cuesta (1992)

nitrogen fixation be used by the pasture. In addition to this, Wilson (1996) mentions that the introduction of trees to the pasture generates adequate conditions for its good development due to the incorporation of organic matter, nutrient cycling, the improvement of soil moisture content and temperature decrease.

The sustainability of the production systems refers to the capacity to maintain their productive indexes without causing internal or external economic or natural damages or alterations (Castillo, 2008, p. 23). According to UN Brundtland Report (1987, p. 1), sustainability is defined as "development that meets the needs of present generations without compromising the ability of future generations to meet their own needs". In relation to the above, the cattle business has defined 5 pillars on which it bases the execution of the different activities to be carried out. One of them is environmental sustainability. In this way, the cattle company implemented a silvopastoral system, which has a water network that is strategically distributed throughout the area, thus avoiding the direct entry of animals to water sources.

It is socially common to hear about the environmental problems that are experienced every day in the Amazon region due to deforestation, generated mainly by cattle ranching. However, the actions of mitigation to the impacts caused to the environment by cattle ranchers are scarce when compared to the threats the Colombian Amazons face. Culturally, livestock producers prefer to impact new areas for production than to work in their current areas. This is mainly due to the fact that the land used is being degraded by leaps and bounds, and a clear cause of this problem is not having determined the environmental costs generated during the production dynamics.

According to FEDEGAN (2017), Colombian livestock plays an important role in the productive dynamics of the country. Colombian cattle farming is equivalent to 2.1 times the poultry sector, 3 times the coffee sector, 3.1 times the flower sector, 4.4 times the porcine sector, 5.3 times the banana sector, 8 times the palm sector and generates 810,000 direct jobs which represent 6% of the national employment and 19% of agricultural employment.

Despite all this, there are deficiencies in the cattle production activity. There is evidence of backwardness and low production rates with high environmental impacts without being integrated into the management of organizations, which require organizational policies that allow for planning and decision making to integrate the ecological wealth of productive units. According to Mintzberg (1993), the strategy is the pattern or plan that integrates the main goals and policies of an organization, and at the same time, establishes the coherent sequence of actions to be taken. Furthermore, it is mentioned that without strategic planning companies are likely to deviate from their sustainability goals. The main axis of a farm is strategic planning as an essential foundation for the development of a livestock enterprise (Buenahora, 2015). The need for clear agricultural horizons is precisely the element that the department's cattle companies lack.

There are several studies that legitimize the benefits of the tree factor in the prairies. Ledesma et al. (2002) address this topic in relation to the reduction of the environmental impact in cattle ranching by raising the positive effects on the soil, biological diversity, preservation of water sources, and the environment. Milera (2013) adds that improved pastures in fertile soils associated with trees lead to better yields. In this same context, Hernández & Robles (1985) mention the major contributions to the benefits derived from their use, such as increased availability of forage, nitrogen fixation, availability of firewood and coal, plus their usefulness as a living fence and wind breaker barrier. In addition, they provide protection to livestock from high temperatures, increase the diversity of species and beneficial insects that help control harmful ones, diversify production on the farm and reduce the use of external marketable inputs.

Likewise, Navas (2007) adds that the production and quality of forage depends directly on the quality and fertility of the soil. The incorporation of tree species improves the cycling of nutrients within the paddocks thanks to their deep roots to which the pastures do not have access. They also incorporate the nutrients into their biomass and then return them to the soil surface through leaf litter inputs. In addition, species such as legumes have the ability to fix high amounts of atmospheric nitrogen, reducing the need for nitrogen fertilization in pastures. This is why Lemus de Jesús (2008) states that SPSs have the potential to contribute to biodiversity conservation by providing habitats and food resources for wildlife and the connectivity of fragmented landscapes. At the same time, they improve soil fertility, conserve water through infiltration and reduce surface runoff, capture carbon and offer economic benefits to cattle farming families by increasing income from obtaining products such as firewood, fruit, wood and fodder. These are systems that generate ecosystem services that need to be recognized, measured and disclosed for the eco-centric and sustainable management of productive units.

Accordingly, the three-dimensional theory of accounting (T3C) is presented, which proposes from bio-accounting an alternative for the recognition,

measurement, and disclosure of ecological wealth impacted and generated by the actions of organizations. It is an alternative that seeks the incorporation of inputs and outputs of marketable and non-marketable products to the accounting information system for decision making and strategic planning. Mejía et al. (2014) provides an accounting basis for the ecological dimension as part of accounting; a dimension that has been ignored by traditional economics. This results in bio-accounting as a proposal for a new discipline from the accounting science that studies the natural wealth of organizations (Mejía, 2014) that would allow for the integration of the ecological dimension to the economic one in regard to productive units. This is aimed at attaining an organizational management with an eco-centric and sustainable vision. As established by Obregón (2016), sustainability requires the organization to have high ethical standards where nature is prioritized.

3. Methodological design

For the evaluation of the agronomic properties of *Brachiaria humidicola* pastures under a silvopastoral system in the humid Amazon tropics and to achieve accounting from the bio-accounting perspective, a case study was developed with a descriptive scope. It only sought to determine the characteristics of the object of research, considering the phenomena studied and their components, measuring variables and concepts (Sampieri, 2018). Likewise, it was established under a non-experimental research design with a quantitative approach, where researchers did not manipulate the study variables. Only the characteristic elements of the SPS that need to be accounted for in decision making at the productive units are taken.

Table 2. Methodological design, H. Sampieri (2014)

Methodological Design	
Scope of the research	Descriptive
Approach	Quantitative
Research Design	Non experimental
Sample Size	Non probabilistic

Source: Authors' elaboration

For the development of the case study, agricultural producers in the municipality of Puerto Milán, Caquetá, who carry out their agricultural practices under a traditional approach, were determined as the target population of the study. Likewise, land and cattle farmers in San Rafael rural area were chosen as the focus of this study, in particular the farm Bellavista, whose owners authorized the comparative analyses of the *Brachiaria humidicola* pastures, one

under a traditional system and another in a silvopastoral system in order to reach the objective of the case study. As for the size of the sample, it was established as non-probabilistic where its election depended more on the phenomena in which they develop than on the probabilities of them occurring. Selection criteria were determined as follows: agricultural producers with more than 5 years of experience in the region under study, farms with a silvopastoral system, farm areas greater than 100 hectares, and dairy farming being their main agricultural practice with 60% of their income coming from this activity.

4. Results and analysis

4.1. Production of *Brachiaria humidicola* biomass in a Silvopastoral System (SPS) with strips of trees

Each phase of data collection was carried out in two areas, the first area in Silvopastoral System (SPS) with strips of trees, which was called Lot A and the second area selected with a traditional management which was called Lot B. The recovery periods that were made in the first, second and third sampling were 26 days.

Table 3. Sample. **AP:** Grass Height **AC:** Cut Height **LC:** Cut Length **AF:** Leaf Area

Sampling Data															
Lot	Sample 1. 22-Feb-2020					Sample 2. 20-Mar-2020					Sample 3. 15-Apr-2020				
	Weight (gr)	AP (cm)	AC (cm)	LC (cm)	AF (cm)	Weight (gr)	AP (cm)	AC (cm)	LC (cm)	AF (cm)	Weight (gr)	AP (cm)	AC (cm)	LC (cm)	AF (cm)
A	383.8	44.6	23.7	20.9	0.68	431.8	46.6	25.3	21.2	0.66	438.4	49.3	23.5	25.5	0.69
B	294.7	35.9	22.7	13.9	0.65	338.6	37.3	22.9	14.4	0.66	340.3	37.1	22.4	14.7	0.67
Variation A-B	**89.1**	**8.7**	**1.0**	**7.0**	**0.03**	**93.2**	**9.3**	**2.4**	**6.8**	**0.0**	**98.1**	**12.2**	**1.1**	**10.8**	**0.02**
Variation % A-B	**23%**	**20%**	**4%**	**33%**	**4%**	**22%**	**20%**	**9%**	**32%**	**0%**	**22%**	**25%**	**5%**	**42%**	**3%**

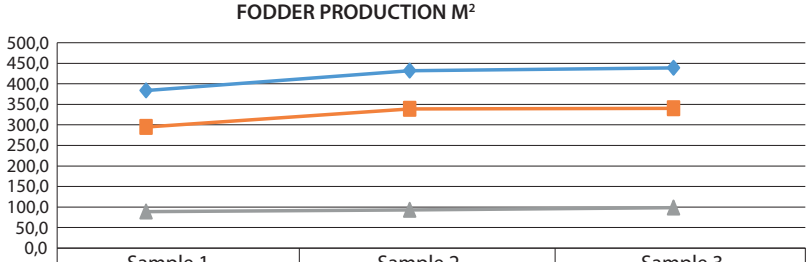
Source: Authors' elaboration

The first sampling was carried out under environmental conditions of drought (dry season), with average temperatures of 32° C, with an average capacity in Lot A of 383.8 gr per m^2, compared to Lot B which yielded an average of 294.7 gr per m^2, for a production of forage in Lot A of 189.1 gr

per m² more than Lot B; which is equivalent to 23.2% higher production in the Silvopastoral System (SPS); likewise, the difference in the development of the forage was observed to be 8.7 cm longer in lot A than in lot B, the cutting length of the vegetable material had a better yield in lot A by 20.9 cm and in lot B by 13.9 cm, thus presenting a variation of 7.0 cm of higher growth in lot A.

The second sample was carried out under rainy weather conditions (rainy season), with average temperatures of 27° C, with a capacity in lot A of 431.8 gr per m², compared to lot B that averages 338.6 gr per m² in forage, for a production of forage in lot A of 93.2 gr per m² more than lot B, which is equivalent to 21.6% greater production in the Silvopastoral System (SPS); a difference in the development of forage of 9.3 cm longer in lot A compared to lot B was observed, the cutting length of the plant material was better expressed in lot A by 21.2 cm and lot B by 14.4 cm, thus presenting a variation of 6.8 cm of greater growth in lot A.

The third sample was carried out under rainy weather conditions (rainy season), with average temperatures of 26° C, with a capacity in Lot A of 438.4 gr per m², compared to Lot B that averages 340.3 gr per m² in fodder, for a production of fodder in Lot A of 192.6 gr per m² more than Lot B, which is equivalent to 22.4% higher production in the Silvopastoral System (SPS). Likewise, the difference in the development of forage of 12.2 cm longer in lot A compared to lot B was observed, the cutting length of the vegetable material yield was better in lot A by 25.5 cm and in lot B by 14.7 cm, thus presenting a variation of 10.8 cm of higher growth in lot A.



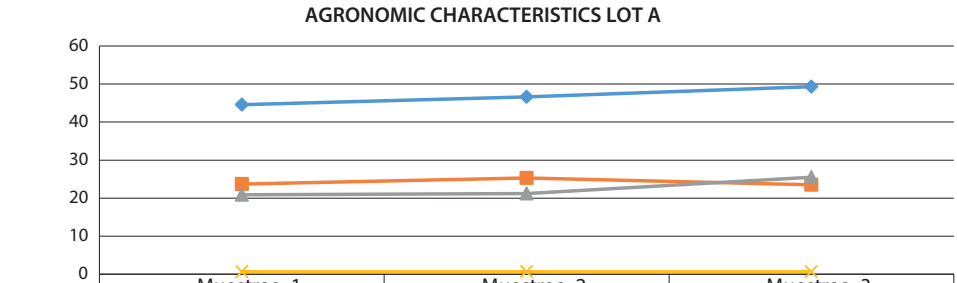
	Sample 1	Sample 2	Sample 3
Lot A Weight	383,8	431,8	438,4
Lot B Weight	294,7	338,6	340,3
A-B Variation	89,1	93,2	98,1

Figure 1. Fodder production m²

Source: Authors' elaboration

Figure 1 clearly shows the difference in the production of forage per m² between the two lots. Likewise, it is possible to determine the trend of the production of pasture that increased in the second sampling and continued in

the same trend in the third data collection, there being a correlation between the performance of pasture with the increase in rainfall presenting more production of forage than in the dry season. This behavior applies in both systems.



	Muestreo 1	Muestreo 2	Muestreo 3
AP	44,6	46,6	49,3
AC	23,7	25,3	23,5
LC	20,9	21,2	25,5
AF	0,68	0,66	0,69

Figure 2. Agronomic characteristics lot A

Source: Authors' elaboration

In the agronomic properties of lot A as seen in Figure 2, there is a clear relationship between the performance of variables AC and LC, in the third sampling this relationship becomes proportional, i.e., if LC increases AC decreases, this being a correlational fact subject to water precipitation, where pasture takes longer to become fibrous.

4.2. Sustainability recognition of the benefits of a humidified *Brachiaria* pasture under a silvopastoral system in humid tropical conditions

According to Pandero (2010), silvopastoral systems help to improve soil fertility, thanks to the effect of the trees within it, thus preventing the degradation of the land and pastures. This is a different case from that of traditional production systems, where poor cattle production practices deteriorate various resources.

Correspondingly, it is inevitable to mention that the productive units that implement silvopastoral systems in their lands, besides perceiving all the benefits already mentioned in the present study, avoid incurring future expenses of renovation of prairies and fertilization of the areas intervened by cattle activity, in relation to areas with a traditional management in which soil erosion, pasture degradation and low fertility occur.

According to FEDEGAN (2011), the costs of prairie renovation in rolling areas of northeastern Antioquia are 1.6 SMMLV (Current Monthly Minimum

Wage) per hectare. According to the ranchers surveyed from the municipality of Milán, the costs of prairie renovation per hectare in the area are 1.07 SMMLV, costs that a rancher who implements a silvopastoral system would avoid according to Mahecha et al. (2002), who mention that by incorporating perennial woody species (trees and shrubs) in traditional cattle production systems, benefits are obtained for soil fertility and structure, thus avoiding erosion and degradation of grasslands and soils, in addition to nitrogen fixation and nutrient cycling in the depths of the soil captured by tree roots.

According to collected results, it was determined that the production of forage per square meter was 93.5 grams higher in lot A than in lot B, as shown in Figure 3. These data allowed us to calculate the difference in income that is not perceived in the traditional system in relation to the Silvopastoral System (SPS).

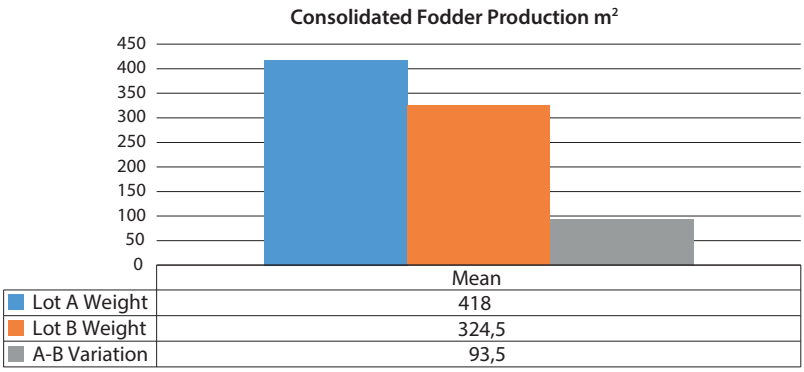


Figure 3. Consolidated fodder production m²

Source: Authors' elaboration

The economic impacts of the silvopastoral system were carried out according to the conditions of the cattle company. These data are shown in Table 4, with an average production of 6.3 cow/liter per day, a price of COP 900-liter, consumption of forage per animal of 12% of live weight. According to Rúa (2010), 46.7 gr/m² of real forage availability calculates 50% use of pasture, equivalent in carrying capacity per hectare to 8.7 cattle heads in lot A. in economic terms, income could be generated by an additional 1.5 SMMLV for milk sales per hectare in the silvopastoral system in relation to a hectare in the traditional system.

Canizales et al. (2019) calculated the costs of establishing a silvopastoral system of aligned trees (strip of trees) per hectare at COP 2,513,340. The cattle company would recover the investment of the setting up of the silvopastoral system in 51 days as long as the conditions exposed in Table 4 continue to be present.

Table 4. Sustainability Recognition of the benefits of a *Brachiaria humidicola* pasture

ECONOMIC IMPACTS SILVOPASTORAL SYSTEM	
Average milk lts/day	6.3
Grams per m^2	93.5
Average waste (Rúa, 2010)	50%
Actual availability gr/m^2	46.7
Area m^2	10,000
Average consumption per animal kg (Rúa, 2010)	54
Kilo	1,000
Increased carrying capacity	8.7
Milk price per liter	COP 900
Income expected to be earned	COP 49,082
Monthly income expected to be earned	COP 1,472,450

Source: Authors' elaboration

4.2.1. Bioaccounting transaction assumption of the increase in carrying capacity

Following the postulates of the Three-Dimensional Theory of Accounting (T3C) presented by Mejía et al. (2016) for the measurement of sustainability in organizations, the registration of the bioaccounting transaction of the increase in the carrying capacity of the productive units as an ecosystem service in the implementation of sustainable systems of cattle production contributing to generate information for decision making is simulated.

Table 5. Transaction of the Bovine Production Unit

Account – Sub-account	Debit	Credit
Green Asset – Carrying Capacity	8.7	
Ecological Income – Carrying Capacity		8.7

Source: Authors' elaboration

5. Conclusions

In the search for systems that contribute to the sustainable development of the Amazon region and subject to the productivity and sustainability of the cattle units in the department of Caquetá, it can be concluded, in the first place, that the benefits of the process offered by silvopastoral systems through the theoretical and practical contributions of the different authors referenced in this study are evident, as well as the need to incorporate them into the accounting

information system leading to decision making and strategic planning of the bovine productive units.

Secondly, a significant improvement in forage production in the pasture with the Silvopastoral System (SPS) of 93.5 gr/m^2 was evidenced in relation to the traditional system. This performance took place during all the study process, reaffirming the advantages that the Silvopastoral System contributes to the area intervened in specific terms of recovery period of pasture and therefore in the animal carrying capacity by hectare.

Finally, the economic viability of the implementation of a silvopastoral system is concluded, as long as the technical conditions of milk production present at the moment are kept, where the recovery period of the cost of setting up a silvopastoral system hectare was observed in 51 days after the system was in operation. This fosters a clear investment policy for the company in relation to the cost benefit of this model of production, as well as the economic attributes attained concerning the oxygenation and renovation of prairies that the silvopastoral system generates by its own inertia.

The case study allowed us to evaluate the agronomic properties of *Brachiaria humidicola*'s pastures under a silvopastoral system in the humid Amazon tropics, where fundamental components were identified regarding sustainable agricultural production and decision making within a productive unit. This was based on the analysis and results of the present study, oriented to the increase of productivity of agricultural companies through sustainable production practices.

Finally, the adaptation of sustainable production practices (SPS) contributes to the optimization of the area, increasing income from economic resources, given the increased carrying capacity of the land and the decrease in income from external inputs.

Bibliography

Acosta Díaz, R.A. (2017). Implementación de prácticas para la recuperación de praderas, en las fincas La Independencia, Mañana de Pascua departamento de Córdoba y la finca La California en el departamento de Sucre (Implementation of practices for the recovery of grasslands, in the farms La Independencia, Mañana de Pascua in the department of Córdoba and La California in the department of Sucre), https://repositorio.unisucre.edu.co/handle/001/582.

Aguayo Guerrero, C.A. (2019). Estructura, caracterización y estado de conservación de los recursos florísticos en la zona alta del bosque protector Murocomba, año 2018 (Structure, characterization and state of conservation of the floristic resources in the high zone of the protective forest Murocomba, year 2018) (Bachelor's thesis, Quevedo-UTEQ).

Barrientos, Z. (2020). Selección de microhábitat, y actividad diaria y estacional del caracol Tikoconus costarricanus (Stylommatophora: Euconulidae) en el sotobosque de bosques tropicales húmedos de montaña. *Revista de Biología Tropical*, 68(4). [Microhabitat selection, and daily and seasonal activity of the Costa Rican Tikoconus snail

(*Stylommatophora: Euconulidae*) in the understory of tropical mountain rainforests. *Journal of Tropical Biology*, 68(4)].

Buenahora, R. (2015). 5 pasos para elaborar un plan estratégico para la actividad ganadera. Contexto ganadero (5 steps to elaborate a strategic plan for the cattle activity. Livestock context). Taken from: http://www.contextoganadero.com/ganaderia-sostenible/5-pasos-para-elaborar-un-plan-estrategico-para-la-actividad-ganadera.

Canizales-Velázquez, P.A., Aguirre-Calderón, Ó.A., Alanís-Rodríguez, E., Rubio-Camacho, E., & Mora-Olivo, A. (2019). Caracterización estructural de una comunidad arbórea de un sistema silvopastoril en una zona de transición florística de Nuevo León. *Madera y bosques*, 25(2). [Structural characterization of a tree community of a silvopastoral system in a floristic transition zone of Nuevo León. *Wood and Forests*, 25(2)].

Castillo, M.I. (2008). Procedimiento metodológico para la evaluación de la eficiencia económica y eficacia socioeconómica del microfinanciamiento a proyectos productivos con enfoque de género. Camagüey, Universidad de Camagüey. gg CEPAL (Methodological procedure for the evaluation of the economic efficiency and socioeconomic effectiveness of microfinance for productive projects with a gender perspective. Camagüey, Camagüey University. gg ECLAC).

FAO (2009). La larga sombra del ganado, problemas ambientales y opciones (The long shadow of cattle, environmental problems and options), 1st ed. Roma. Disponible en: http://www.fao.org/3/a-a0701s.pdf.

FEDEGAN (2011). Capacitación a profesionales en establecimiento y manejo de praderas (Training professionals in grassland establishment and management), p. 21. Taken from: http://www.fedegan.org.co/capacitacion-profesionales-en-establecimiento-y-manejo-de-praderas.

FEDEGAN (2017). Cifras de referencia del sector ganadero colombiano (Reference figures of the Colombian livestock sector). Taken from: file:///C:/Users/Downloads/Cifras_Referencia_2017.pdf.

García, H. (2014) Deforestación en Colombia: Retos y perspectivas (Deforestation in Colombia: Challenges and Perspectives), http://www.repository.fedesarrollo.org.co/handle/11445/337.

Hernández, D., Rosete, A., & Robles, F. (1985). Sistema de pastoreo rotacional para la producción de leche con C. dactylon. II. Efecto del tiempo de estancia. *Pastos y Forrajes*, 8(2) [Rotational grazing system for milk production with C. dactylon. II. Effect of the time of stay. *Pastures and Forages*, 8(2)].

Ledesma, L.M., Gallego, L.A., & Peláez, F.J. (2002). Situación actual de la ganadería de carne en Colombia y alternativas para impulsar su competitividad y sostenibilidad. *Revista Colombiana de Ciencias Pecuarias*, 15(2), 213–225.

Lemus de Jesus, G. (2008). Análisis de productividad de pasturas en sistemas silvopastoriles en fincas ganaderas de doble propósito en Esparza, Costa Rica (Analysis of the productivity of pasture in silvopastoral systems of cattle dual purpose farms in Esparza, Costa Rica). No. Thesis L562a. CATIE, Turrialba (Costa Rica).

Mahecha, L. (2003). Importancia de los sistemas silvopastoriles y principales limitantes para su implementación en la ganadería colombiana. *Revista Colombiana de Ciencias Pecuaria* (Importance of silvopastoral systems and main limitations for their implementation in Colombian cattle farming. *Revista Colombiana de Ciencias Pecuaria*). Available at: <http://www.redalyc.org/articulo.oa?id=295026121002> ISSN 0120-0690 (access: 2017).

Mahecha, L., Angulo, J., & Manrique, L.P. (2002). Estudio bovinométrico y relaciones entre medidas corporales y el peso vivo en la raza Lucerna (Bovinometric study and relations between body measurements and live weight in the Lucerne breed). *Revista Colombiana de Ciencias Pecuarias*, 15(1), 80–87.

Maldonado Lima, K.D. (2016). Estructura y composición florística, posterior al aprovechamiento de un bosque húmedo tropical en el nororiente de la amazonía ecuatoriana (Bachelor's thesis). (Structure and floristic composition after the use of a tropical humid forest in the northeast of the Ecuadorian Amazon). https://go.gale.com/ps/anonymous?id=GALE%7CA207945695&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=01233068&p=IFME&sw=w.

Martínez, C. (2009). Sistemas de producción agrícola sostenibles (Sustainable agricultural production systems). Current situation of the cattle ranch in Colombia and alternatives to promote its competitiveness and sustainability. *Revista Colombiana de Ciencias Pecuarias*, 15(2), 213–225. Taken from: file:///C:/Users/Downloads/Dialnet-SistemasDeProduccionAgricolaSostenible-4835851.pdf.

Mejía, E., Mora, G., Montes, C., & Montilla, O. (2014). Marco Conceptual de la biocontabilidad. *Sinapsis*, (6), 94–111 [Conceptual framework of bioaccounting. *Synapse* (6), 94–111].

Mejía Soto, E. (2014). Biocontabilidad: Hacia una definición de una nueva disciplina contable. *Lúmina*, (15), 106–129 [Bioaccounting: Towards a definition of a new accounting discipline. *Lúmina*, (15), 106–129]. https://doi.org/10.30554/lumina.15.1069.2014.

Mejía Soto, E. and Ceballos Rincón, O.I. (2016). Medición contable de la sustentabilidad organizacional desde la Teoría Tridimensional de la Contabilidad. *Revista General José María Córdova*, 14(18), 215–243. ISSN: 1900-6586 [Accounting measurement of organizational sustainability from the Three-Dimensional Theory of Accounting. *Revista General José María Córdova*, 14(18), 215–243. ISSN: 1900-6586].

Mejía Soto, E., & Serna, C.A.M. (2015). La contabilidad en función de la sustentabilidad: una mirada desde el desarrollo económico alternativo. *Quipukamayoc*, 23(44) [Accounting for sustainability: a view from alternative economic development. *Quipukamayoc*, 23(44)].

Milera, M. (2013). Contribución de los sistemas silvopastoriles en la producción y el medio ambiente. *Avances en Investigación Agropecuaria*, 17(3), 7–24 [Contribution of silvopastoral systems to production and the environment. *Advances in Agricultural Research*, 17(3), 7–24].

Mintzberg, H. (1993). El proceso estratégico, conceptos, contextos y casos. Juárez: Prentice-Hall Hispanoamericana, S.A. (The strategic process, concepts, contexts and cases. Juarez: Prentice-Hall Hispanoamericana, S.A.).

Molina, J.E.Á., & Franco, L.F.L. (2011). Evaluación de dos sistemas de pastoreo (rotacional y continuo) sobre variables técnicas, productivas y económicas en novillos cebú comercial en el trópico bajo. *Revista Politécnica*, 7(12), 119–135 [Evaluation of two grazing systems (rotational and continuous) on technical, productive and economic variables in commercial zebu steers in the low tropics, 7(12), 119–135]. https://revistas.elpoli.edu.co/index.php/pol/article/view/185.

Montoya, C.A.S. (2016). Silvopastoreo una alternativa para el ambiente y la producción. *Zoociencia*, 3(2) (Silvopastoralism an alternative for the environment and production). https://revistas.udca.edu.co/index.php/zoociencia/article/view/515.

Navas Panadero, A. (2007). Sistemas silvopastoriles para el diseño de fincas ganaderas sostenibles. *Revista ACOVEZ*, 16, 3–5 (Silvopastoral systems for the design of sustainable livestock farms. *ACOVEZ Magazine*, 16, 3–5).

Obregón, L.S. (2016). La ética, el desarrollo sostenible y la responsabilidad social en las organizaciones. Fundación Dialnet: Universidad de la Roja, 6 (Ethics, sustainable development and social responsibility in organizations. Dialnet Foundation: Universidad de la Roja, 6).

Organización de las Naciones Unidas (1987). Informe Brundtland, Nuestro Futuro Común. De la Comisión Mundial sobre el medio ambiente y el desarrollo de la ONU

(United Nations Organization) (1987) (Brundtland Report, Our Common Future. From the UN World Commission on Environment and Development).

Pandero, A. (2010). Importancia de los sistemas silvopastoriles en la reducción del estrés calórico en sistemas de producción ganadera tropical (Importance of silvopastoral systems in reducing caloric stress in tropical livestock production systems), p. 3. Taken from: http://www.scielo.org.co/pdf/rmv/n19/n19a10.pdf.

Pérez, R., Lascano, C. (1992). Pasto Humidícola (*Brachiaria humidícola*). CIAT (CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL) [Humidicultural grass (*Brachiaria humidícola*). CIAT (INTERNATIONAL CENTER OF TROPICAL AGRICULTURE)].

Rincón, A., Flórez, H., Ballesteros, H., & León, L.M. (2018). Efectos de la fertilización en la productividad de una pastura de *Brachiaria humidicola* cv. Llanero en el Piedemonte de los Llanos Orientales de Colombia. *Tropical Grasslands-Forrajes Tropicales*, 6(3), 158–168 [Effects of fertilization on the productivity of a *Brachiaria humidicola* cv. Llanero pasture in the Piedemonte de los Llanos Orientales of Colombia. *Tropical Grasslands-Forrajes Tropicales*, 6(3), 158–168].

Rúa Franco, M. (2010) ¿Cómo aforar un potrero para pastorear correctamente? (How to properly prepare a paddock for grazing? Argentinean Site of Animal Production). Sitio Argentino de Producción Animal. Retrieved from: http://www.produccionanimal.com.ar/produccion_y_manejo_pasturas/pastoreo%20sistemas/139-AFORAR_POTRERO.pdf.

Ruiz Betancourt, M. (2018). Plan de manejo de praderas con uso de porquinaza en la hacienda La Ley, Valparaíso, Antioquia (Prairie management plan with use of pig dung runoff on the farm La Ley) (Doctoral dissertation, Corporación Universitaria Lasallista). Retrieved from: http://repository.lasallista.edu.co/dspace/handle/10567/2418.

Sampieri, R.H. (2014). *Metodología de la investigación: las rutas cuantitativa, cualitativa y mixta*. México: McGraw Hill.

Spain, J.M., & Gualdrón, R. (1991). Degradación y rehabilitación de pasturas. Estabelecimento y renovación de pasturas: conceptos, experiencias y enfoque de investigación (Degradation and rehabilitation of pastures. Establishment and renewal of pastures: concepts, experiences, and research approach), Cali: CIAT, 269–283.

Tacarpo Antivo, A.M. (2018). Estimación del potencial de captura de carbono de las especies de flora predominante de la parte alta del bosque de la comunidad campesina de Tumpa – provincia de Yungay (Estimation of the carbon sequestration potential of the predominant flora species in the upper forest of the rural community of Tumpa-Yungay Province).

Wilson, J.R. (1996). Shade-stimulated growth and nitrogen uptake by pasture grasses in a subtropical environment. *Australian Journal of Agricultural Research*, 47, 1075–1093.

Abstract

Bio-accounting recognition approach of agronomic properties in *Brachiaria humidicola* pastures under a Silvopastoral System in the humid Amazon tropics

This study was conducted at the livestock company located in the San Rafael rural area of the municipality of Puerto Milán, Caquetá. For the development of the case study, the agronomic properties of *Brachiaria humidicola* pasture were evaluated, which are the basis for the bio-accounting processes in a Silvopastoral System (SPS). Under a descriptive

research scope and a non-experimental study design, two comparative analyses of *Brachiaria humidicola* pastures are carried out; one analysis under a traditional system and another one in a silvopastoral system, obtaining the production of 93.5 gr/m^2 forage more in the SPS in relation to the traditional system, which is counted under the guidelines of the Three-dimensional Accounting Theory (T3C). This system determines the productive and ecological importance of implementing sustainable production systems, which represent factors that need to be integrated into the accounting information system of organizations for decision making under the perspective of sustainability.

Keywords: Bio-accounting, T3C, silvopastoral systems, sustainability, pasture, traditional system

II. REGIONAL ISSUE

Peace, healthy environment, and autonomy. Agroecological practices as a transformation alternative in Colombian rural Andean communities

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Introduction

Starting from the premise that the refugee crisis is a phenomenon that is growing in the world, this paper addresses the challenges of implementing the Sustainable Development Goals (SDGs) in forced migration contexts. We use data from three ethnographic case studies located in Colombia. Through these cases, we analyze how these challenges are structured, what their institutional frameworks are and what alternatives can be chosen that allow for the achievement of economic, environmental, and social sustainability by the internally displaced people. In summary, we propose that establishing synergies in between SDGs from social inclusion axis and SDGs from environment axis creates opportunities to defend internally displaced people's rights.

As stated by the United Nations High Commissioner for Refugees (UNHCR, 2019), there are around 79,5 million refugees in the world, which corresponds to 1% of the global population. These people generally inhabit territories affected by alimentary insecurity, malnutrition, climatic risk, and natural disasters (UNHCR, 2019). Internally displaced people are among the most vulnerable people because, contrary to refugees, victims of internal displacement stay in their own country under the government's protection, even when in some cases the government is responsible for their migration (UNHCR, n.d.).

The Colombian case corresponds with an armed internal conflict in which peasant, indigenous and afro-descendant people have been the main affected groups for more than 50 years. According to the Colombian Integral Attention and Reparation of Victims Unit (UARIV, 2020), internally forced migration in Colombia has affected around 8,254,461 people. It also had an impact on around 90% of the country's municipalities, which have been affected by this phenomenon, either by immigration or emigration (Ibáñez, Moya, 2008). These numbers led to declaring Colombia as the second country in the world with the highest level of forced migration after Syria (UNHCR, 2017).

In Colombia, forced migration is not only a violent act on itself; instead, it is a consequence of other violent acts, such as persecution, menacing, forced disappearance, torture, rape, abuse, confinement, or murder. Diverse factors are intertwined in this context, such as psychological, cultural, and environmental factors (Escobar et al., 2005). Thus, the imminent risk of both losing the territory and the disappearance of the cultural referents makes forced migration metamorphose into deterritorialization (Escobar et al., 2005).

This phenomenon hinders the possibilities of economic, social, and environmental sustainability of displaced families – whose origin is mostly rural – because it implies losing their land, their homes and family assets (Ibáñez, Moya, 2008). At the same time, it generates unemployment, marginalization, insalubrity, social rupturing and impoverishment, symbolic expropriation, and knowledge loss. Forced migration also affects alimentary security and the ways in which people relate to their ecosystems (Escobar et al., 2005). Specifically, it affects local ecological knowledge (Achicanoy, 2020) such as seed management practices, traditional medicine, cooking, raising cattle, hunting, fishing, among other practices that cannot be replicated in the receptor territories (Achicanoy, 2020; Caicedo, 2005).

Many victims migrate to places very different from their territory of origin, migrating from a rural style of living into an urban one (UNHCR, 2013). Also, they can migrate into a contrasting geographical context, for example, going from a coastal region to a mountainous or a sylvan one. In addition, there are cases in which people migrate into places with similar conditions to their territory of origin as an attempt to keep their lifestyle and social relationships. This is illustrated by migrations within the same altitudinal range or by temporal visits to the place from which they were exiled. Nonetheless, even when the characteristics of the destination are similar, those migrations cause uprooting, on the grounds that people are being taken away from their landscape, from their usual environment and thus, from the relationships they have with it (Centro Nacional de Memoria Histórica, 2013).

Just as the causes of migration are complex, so are its effects, and its impact can rarely be characterized as solely positive or negative. According to Nesheim, Dhillion & Stølen (2006), migration can have effects over ecosystems, such as raising pressure over natural assets or creating conflicts over the distribution

of natural resources among local and recently arrived communities. On the other hand, migrants can provide knowledge and practices that are new on the arrival territory and that, simultaneously, can be favorable in terms of usage and management of natural resources. This has been evidenced by Achicanoy (2020) in the context of La Celia (Risaralda), a migrant-receptor municipality, where a group of internally displaced people propose a series of agroecological experiences as pacifying and reparation alternatives that value local knowledge.

As Escobar (2000) states, the disappearance of place is linked to the erasing of the culturally specific ways in which people relate to nature. Those models account for the rooting in a territory, seen as a multi-dimensional entity produced by practices, traditions and complex relationships that give a sense to the world (Escobar, 2000). Consequently, forced migration and similar phenomenon cause a distortion of place, which, subsequently, has profound effects on culture comprehension, knowledge, nature, and economy (Escobar, 2000). Additionally, this author states that the rupture of place can be understood as homogenization.

Nevertheless, forced migration is not a process with a predictable ending. Based on their knowledge, social relationships and local assets, communities undertake processes of resistance, return and rebuilding of their place, accounting for "resistance arts" (Scott, 2000) that articulate "disperse creativity", "tactical" and "artisanal" operations (de Certeau, 2000) of historically marginalized local groups, as evidenced by García Arenas (2006) and Rodríguez-Herrera (2020) on the migrant-emitting context of Tuluá (Valle del Cauca). In Tuluá, Peasant's Agroecology Schools have contributed to the reterritorialization of a group of people affected by forced migration.

Methodology

A multiple case study is proposed, aiming to analyze local challenges around SDGs implementing. The research takes place in La Celia (Risaralda) and Tuluá (Valle del Cauca) (Figure 1), two Colombian municipalities where we worked along two farmers' associations: 1) Association of Victims from La Celia and 2) Sustainable Agroecological Schools' Association from San Rafael (Tuluá). Using data from the ethnographic field work made together with these associations in the years of 2006, 2019 and 2020, this writing reflects on the potential of agroecology to articulate integral reparation proposals for victims of forced displacement in Colombia. Our database comes from three independent research studies, whose results are related in this analysis: Achicanoy (2020), Rodríguez-Herrera (2020) and García Arenas (2006). These investigations used non-probabilistic strategical sampling and their used methods were participant observation (registered on a field diary), semi-structured interview, structured interview, and workshops.

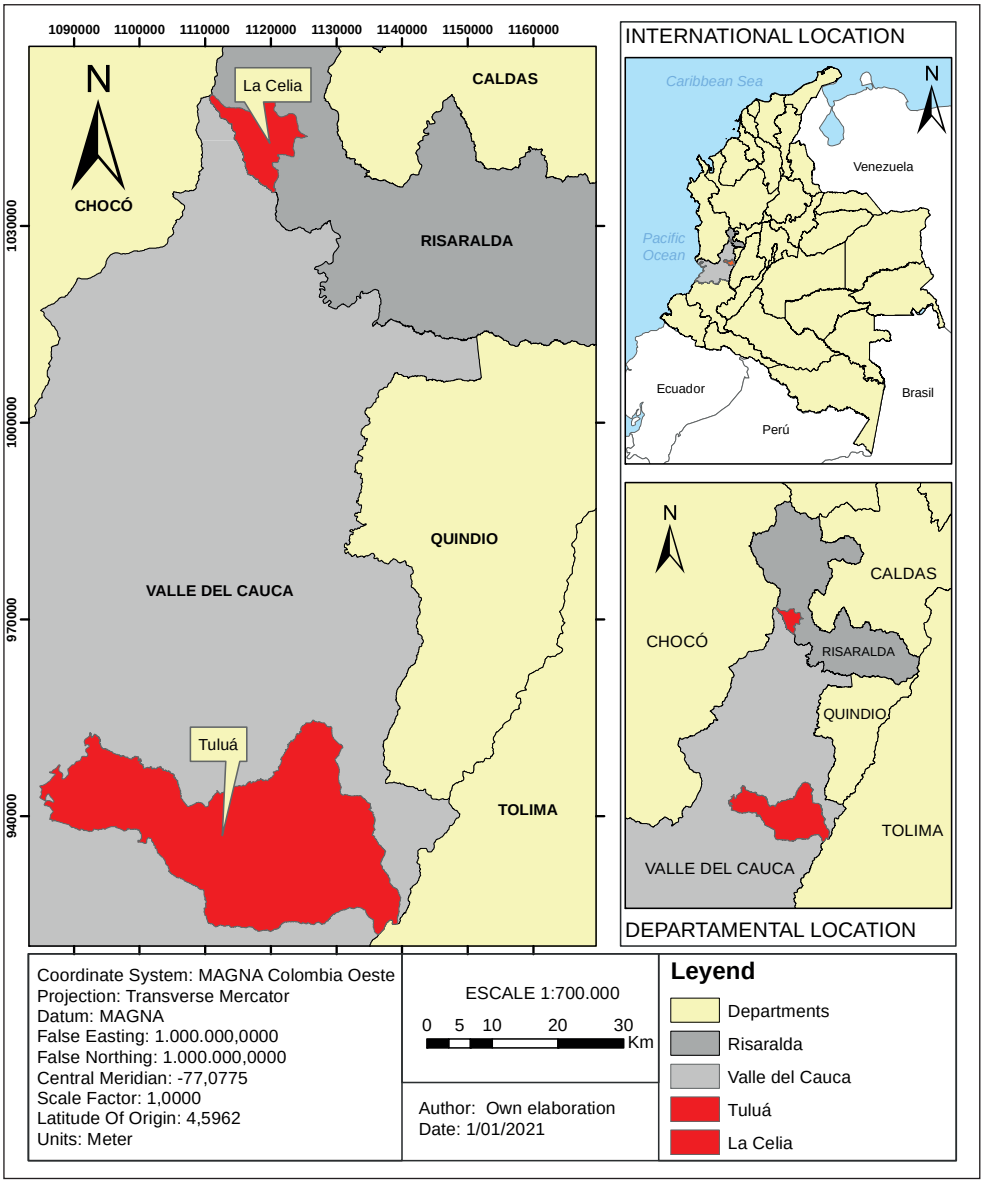


Figure 1. Geographical location of La Celia (Risaralda) and Tuluá (Valle del Cauca), Colombia

Source: Authors' elaboration

Victims Association from La Celia (ASOVILACEL) (La Celia, Risaralda)

La Celia is a municipality from Risaralda located at 1380 masl. Historically, the economic focus of this municipality has been coffee production, which accounts for around 70% of its economy (Rodríguez-Herrera, 2017). Created at the beginning of 20th century, it is a recently occupied municipality. People of diverse origins, especially from Antioquia' Department, coexist there (Rodríguez-Herrera, 2017). As a result of the armed conflict of the last decades, La Celia has found itself in a victim-receiving context. Since the signing of the peace treaty with the Colombian Revolutionary Armed Forces (FARC), victims begun to make themselves visible and denounce victimizing actions.

For these purposes, the Victims Association from La Celia (ASOVILACEL) was created in 2018; it groups around 100 people from Colombian Coffee Region (departments of Caldas, Risaralda, and Quindío), Antioquia and Valle del Cauca (Achicanoy, 2020). Its associates labor such as raising cattle, fishing, hunting and orchard maintenance, albeit the predominant labors are those linked to coffee growing (Achicanoy, 2020).

Also, the associates recall having witnessed massacres, selective assassinations, assaults, confrontations between different armed actors (army, guerrillas, and paramilitary armies), death of family members by homicide or forced disappearance, menacing, abduction, intimidation, and sexual violence, which happened in the places where they were expelled (Achicanoy, 2020). In consequence they conceive forced migration to municipality of La Celia as the last step in a violence-*continuum*.

However, it often happens that long-time-dwellers from La Celia doubt the victims' condition and their differential rights, creating re-victimizing situations. Regarding this, the associates consider that their local ecological knowledge can become a key factor in social integration and reparation that allows visibility to their contributions on the construction of Celianese territory. They argue that productive diversification with native seeds is the base for the recognition of their cultural diversity and autonomy. In this sense, associates from ASOVILACEL think its desirable to develop initiatives such as "community museums to preserve historical memory of the exiled peasant", "courses on alimentary security", "implementing traditional seeds for crop diversifying", "implementing itinerant peasant libraries" and "agroecological fairs" (Achicanoy, 2020, p. 140).

Sustainable Agroecological Schools' Association from San Rafael (Tuluá, Valle del Cauca)

San Rafael is a *corregimiento* (group of rural villages) from Tuluá municipality located at 1150 mamsl. Over there, around 214 homes have been practicing family agriculture based on coffee, cocoa, sugarcane, plantain, bananas, maize, vegetables, beans, fruits, bovine cattle, pigs, birds, fish, and others crops of orchard (García Arenas, 2006). In 2001 the idea of creating an Agroecology Peasant's School emerged, guided by Pedro Nel Romero, a local farmer and expert in medicinal plants. The school seems a civil resistance alternative to the armed conflict that, along the coffee crisis, generated economic instability in San Rafael (García Arenas, 2006).

According to our data, the armed conflict became more hostile in San Rafael between 1999 and 2001, victimizing and displacing most of the local farmers. With the support of the Colombian-French Red Cross, the Municipal Government and environmental authorities, the Agroecological Peasant's School gathered 23 resisting and returning families to start an ecological transition process (García Arenas, 2006). This process consisted in the ecological management of poultry and pigs, installing vegetable plots, growing medicinal plants, and preparing bio-fertilizers, shampoo, ointments, and insect repellents (García Arenas, 2006; Rodríguez-Herrera, 2020). Finally, in 2005, the School decided to stop being an informal group and became official as the Sustainable Agroecological Schools' Association from San Rafael (ASEAS).

As García Arenas (2006) stated, circa 2006 this school tended to reduce "the agroecological proposals to organic agricultural practices" (p. 85). One and a half decades later, according to Rodríguez-Herrera (2020) records, ASEAS has been subject of diverse institutional interventions (national and international), partakes in different activism networks and advances in its project of reaching alimentary sovereignty. During this process they have achieved an increment of their politic reflexibility. Currently, the association is interested in generational renewal and in strengthening the associates' territorial rooting. In this sense, they avoid remembering too many situations of armed conflict; rather, they focus on "recovering energy and cheering up" and making their agroecological transition proposal more "striking". The purpose of this is to teach younger people to be in love with rurality, to set their roots in it and to be proud of being peasants.

"How to make a young person fall in love with being here?" is a question that currently challenges this association (Rodríguez-Herrera, 2020). Regarding this, they have created a group consisting of 30 children and young people in which they run cultural, educative, and touristic agroecological projects. Besides that, they also have a demonstrative farm in which they want to install a museum, a place for memory and identity, and historical units concerning the history of the territory and the armed conflict (Rodríguez-Herrera, 2020).

Conclusions

Throughout the presented cases we illustrate that it is not possible to reach peace, justice, and strong institutions (SDG 16) if local communities keep uprooted from their territories. In these communities affected by a long-term armed conflict, which has threatened peasants' dignity and identity and is an inherent part of dispossession and banishment, the words of Civallero (2017) are of tremendous value. He says that "war does not solely imply to seize assets, people and territories: it also needs to erase the opponent's memory, its remembrances, the reasons that hold together its identity and push it to resist, to fight back, to live" (pp. 1–2). Therefore, we are talking about erasing memories, but also about resistances and challenges in terms of the SDGs.

Imagining other possible futures from the point of view of agroecological ethics seems to be a way of resistance for victimized communities from La Celia and Tuluá. From their perspective, the peasant's defense of Life and Ecosystems (SDG 15) means not only defending ecosystems, but also defending the living and dignity of the people that inhabit them. Given its potential to create sustainable productive systems, generational renewal, social integration, territorial and alimentary autonomy, to activate practical knowledge and promote peasant pride and self-esteem, agroecology emerges as an antidote to the social and ecological fragmenting left behind by war.

Agroecological proposals, such as those reviewed in La Celia and Tuluá, show that the SDGs cannot operate in isolation but rather must be articulated. They also demand us to comprehend the historical roots of SDGs and the causes of unsustainability, associated to the rupture between people and their environments.

Finally, we are invited to re-think scholars' and government's compromise, beyond SDGs, with the necessities felt by local communities, homogenized in national identity and marginalized from (and by) developmentalist projects. These communities, as illustrated by the study cases that nurture this paper, have been creatively self-managed their own territorialization processes and mitigated their condition as victims of forced displacement.

Bibliography

Achicanoy, L.M. (2020). Saberes Ecológicos Locales en víctimas del desplazamiento forzado. Análisis y recomendaciones de política pública desde un contexto receptor [Undergraduate thesis, Universidad Tecnológica de Pereira].

Caicedo, L.P. (2005). Mujer indígena y las consecuencias del desplazamiento para su cultura. In: E. Escobar, P. Escobar, A. Pazmiño & A. Ulloa (eds.), *Las mujeres indígenas en los escenarios de la biodiversidad* (pp. 185–202). International Union for the Conservation of Nature.

Centro Nacional de Memoria Histórica, Goverment of Colombia [Colombian National Centre of Historic Memory]. (2013). *¡Basta ya! Colombia: Memorias de guerra y dignidad* (2nd edition). Imprenta Nacional. http://www.centrodememoriahistorica.gov.co/descargas/informes2013/bastaYa/bastaya-memorias-guerra-dignidad-new-9-agosto.pdf.

de Certeau, M. (2000). La invención de lo cotidiano. I. Artes de hacer [trans. Alejandro Pescador]. Universidad Iberoamericana – Biblioteca Francisco Xavier Clavijero.

Civallero, E. (21 de noviembre 2017). Cuando la memoria se convierte en cenizas… Memoricidio durante el siglo XX. Universidad Nacional de Córdoba. https://www.aacademica.org/edgardo.civallero/23.pdf.

Escobar, A. (2000). El lugar de la naturaleza y la naturaleza del lugar: ¿globalización o postdesarrollo? In: E. Lander, *La colonialidad del saber: eurocentrismo y ciencias sociales. Perspectivas latinoamericanas* (pp. 113–143). CLACSO-UNESCO.

Escobar, E., Escobar, P., Pazmiño, A., Ulloa, A. (eds.). (2005). Las mujeres indígenas en los escenarios de la biodiversidad. IUCN.

García Arenas, A.M. (2006). Escuelas Campesinas de Agroecología. Capital Social para la Soberanía Alimentaria en el Eje Cafetero. Master's thesis, Pontificia Universidad Javeriana.

Ibáñez, M. & Moya, A. (2008). La población desplazada en Colombia: Examen de sus condiciones socioeconómicas y análisis de las políticas actuales. Colombian National Planning Department.

Nesheim, I., Dhillion, S.S., & Stølen, K.A. (2006). What happens to traditional knowledge and use of natural resources when people migrate? *Human Ecology*, 34(1), 99–131.

Rodríguez-Herrera, D.M. (2017). Hacer espacios en patrimonialización. Prácticas cotidianas en la formación del 'Paisaje Cultural Cafetero' de Colombia – Patrimonio Mundial. Doctoral thesis, Universitat de València.

Rodríguez-Herrera, D.M. (2020). Iniciativas de Transformación y asociatividad en comunidades rurales andinas. Posdoctoral Report No 8, Ministerio de Ciencia Tecnología e Innovación de Colombia & INNOGEST S.A.S.

Scott, J. (2000). Los dominados y el arte de la resistencia. Discursos ocultos. Ediciones Era.

UARIV (Colombian Integral Attention and Reparation of Victims Unit), Goverment of Colombia (2020). *Cifras Desplazamiento*. https://cifras.unidadvictimas.gov.co/Home/Desplazamiento.

UNHCR (United Nations High Commissioner for Refugees) (2013). Desplazados internos fuera de los campos: El papel de las autoridades locales en Colombia. Estudio comparado en Bogotá DC y Cali. http://www.acnur.org/fileadmin/scripts/doc.php?-file=fileadmin/Documentos/Publicaciones/2014/9530.

UNHCR (United Nations High Commissioner for Refugees) (2019). Tendencias Globales: Desplazamiento Forzado Tendencias 2018. https://www.acnur.org/5eeaf5664.pdf.

UNHCR (United Nations High Commissioner for Refugees) (2017). Tendencias Globales: Desplazamiento Forzado Tendencias 2016. http://www.acnur.org/fileadmin/scripts/doc.php?file=fileadmin/Documentos/Publicaciones/2017/11152.

UNHCR (n.d.). La protección a los desplazados internos. http://www.acnur.org/aquienayuda/desplazadosinternos/?sword_list[]=desplazamiento&sword_list[]=forzado&sword_list[]=en&sword_list[]=colombia&no_cache=1.

Abstract

Peace, healthy environment, and autonomy. Agroecological practices as a transformation alternative in Colombian rural Andean communities

Sustainable Development Goals (SDGs) are constituted by a set of targets of universal pretension, which aim to "transform our world" through prosperity. This paper asks about the local expression of these global goals. To do this, we analyzed some agroecological transformation initiatives led by Colombian Rural Andean Communities located in contexts influenced by armed conflict. We argue that agroecological practices based in cultural and territorial differences are local transformation alternatives that concur with the SDGs. These agricultural practices defend the ecosystems' lives (SDG 15) and radically advocate for people's autonomy, peace, justice, and strong institutions (SDG 16), which is crucial in peace processes and integral reparation to the victims of the Colombian armed conflict. Such approach allows to rebuild knowledge and identities in cases marked by forced migration of the rural communities. According to our inquiries, agroecological practices have the possibility to structure integral reparation proposals formulated by the victims themselves: "community museums to preserve historical memory of the exiled peasant", "agroecology workshops", "courses on alimentary security", "implementing traditional seeds in crop diversification", "implementing itinerant peasant libraries", "agroecological fairs" and "*mingas*", among others.

Keywords: Sustainable Development Goals, agroecology, ecosystems, peace, Andean communities, transformation initiatives

Environmental governance in south-central Caldas, a reflection on public policy for risk management

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> The country is lost through laziness, but we, who think we know our history and our psychology, come today to prove that the country is lost through lack of tolerance.
>
> Rafael Uribe Uribe

1. Introduction

The liberal ideology of democratic construction based on tolerance, the defense of freedom, respect for opposing opinions, and peaceful and equitable relations are, to a large extent, the driver of the proposal we are introducing. We accept that international trade and economic openings, including free trade agreements, are mechanisms to facilitate foreign investment, capital flows, the formation of incremental wealth and are an essential part of the new conditions of the environment of globalization to which Colombia belongs as a member of the Organization for Economic Cooperation and Development (OECD). The policies of strategic alliances to face the challenges of combating poverty, exclusion, income inequality, and gender parity must allow peaceful coexistence with nature. But they also require a civilized cultural dialogue to develop models of autonomy and management of resource use for the good of all. This paper explores the management of policies that favor civil and cultural resistance to the exposure of Colombian society to the patterns of the consumer economy. In the analysis of the conditions of poverty in our country, priority is given to the meta-right not to endure hunger and therefore to the policy of food sovereignty, as a primary strategy in defense of the environment, peasant work and the occupation of the territory in civic cooperation with mutual advantages.

1.1. Facts in the occupation of the territory

Tropical mountain forests have always had a varied flora and fauna, a biodiversity in artistic expressions of a nature linked to thermal floors ranging from perpetual snow to warm valleys. For this reason the Indians did not build on the shores of these torrential water channels, because of winter – irrigation.

History reminds us of the foundation of the Manuelita sugar mill by Santiago Eder, the American lawyer seduced in the second half of the twentieth century by the Cauca Valley, the fifth most fertile valley in the world. The coffee colonization of western Colombia brought grain production industry for export. The Japanese, although few in number, also fell in love with the place and worked the lands of Palmira, using tractors, introducing business methods for cultivating soy, cotton, sesame and corn. Also, at that time the National Federation of Coffee Growers, the most influential private guild in Colombia in the twentieth century, was established.

It is equally difficult to agree on explanations about the concentration of land, the phenomenon of the great extension of large estates and the well-known phenomena of continuous fragmentation with the generation of smallholdings and minimal parcels, given the facets of the perspectives of analysis from positivist, traditionalist, structuralist, Marxist and spiritual-ecological schools. In the general conditions of James Lovelock's Gaia theory (1974), we are talking about an integral body, a living being which is the earth, and therefore it elaborates its own conditions of development, evolution and adaptation to the conditions that arise in its actions as a habitat for human beings, flora and diverse fauna.

The conditions of the land are differentiated by climates, seasons and beneficial or adverse results according to the position in the hemispheres and continents, from there arise interpretations about comparative and competitive conditions to explain levels of development, scales of productivity and efficiency in the use of resources and the economic retribution and capacity of material accumulation that derives from these conditions. In this paper we elaborate a thesis that, if not original, at least shows us that complexity can have a way of clarification, if we enunciate in the Colombian case the optics of the indigenous myth and the profound opportunity of harmonic civilized life with nature, of what we would call the paradigm of the humanized jungle (Mejía, 2013, p. 25).

This is the true context in the Colombian case, the existence of a jungle that can be harvested, used in the harmonic life as contemplated in the myth of Yurupari, the religious and spiritual essence of the Aimara teaching, the millenary life experience of indigenous communities that populated our current national territory and that came up with great inventions such as agriculture coming from the jungle with the selection of proteins, energetics, vitamins, healing and medicinal essences, building materials, technological designs of irrigation and drainage, seasonal location in the use of the family and communal chagra (a loanword from the Quechua word *chagra,* meaning "farm or agricultural field") ritual and shamanic substances in the spiritual conduction of the associated communities.

This is the difference that from the scientific, cultural, and technological point of view places us in the possibility of facing climate change through the arboreal culture to solve the food supply with the sufficiency of energy and protein resources. This story is therefore a manifestation of the strategic windows through which Colombian society can look out, in the company of neighbors also in need but favored by the ecological conditions and availability of flora and fauna resources.

In a certain sense, this reflection is inscribed in environmental history, understood not as sophistication in the analysis of causes and effects of natural evolution and of the phenomena occurred in eons of millennia, but understood with the simplicity of the unprepared observation of the wisdom of nature itself, although in clear confrontation over the monopolization of scientific paradigms that privilege the technological outputs of the multinational corporation and as an expression of the current imperialist domination of public and private decisions.

2. Methodology

It is a qualitative research, with a descriptive-interpretative design (Taylor, Bogdan, 1987, p. 20), which synthesize the defining criteria of qualitative studies as follows; "This type of research is inductive, which allows the researcher to understand and develop concepts based on data patterns; it follows a flexible research design, its study begins with vaguely formulated questions and understands the context and relationships from a holistic perspective". A descriptive-interpretative design was used. The interpretative design, according to Erickson (1989), seeks to transcend the social subject to explain and understand more complex social facts or phenomena, relying on a deep theoretical approach to the social fact or cultural phenomenon under study. The descriptive design, according to (Palella, Martins, 2004), aims to interpret factual realities and includes description, recording, analysis and interpretation of the actual nature, the composition or processes of the phenomena. The phenomena that have transcended and transcend to find scientific explanation on the course of environmental governance are taken as a frame of reference, at a time when the development and legitimacy of the territory are influenced by the pandemic of COVID-19 and the accelerated transformations that give timely response to such social phenomena.

3. Theoretical framework

Mario Mejía Gutiérrez says in his book *Sendas: hacia taos agrícolas alternativos* (2016), "If October 4th and April 4th have not been established the

equinoctial rains in the Colombian equatorial belt, worry about it". James Lovelock's *The Revenge of Gaia* (2007) provides options to deal with climate change in developed contexts, but at the equatorial level in the possibilities of alternative agriculture, it is necessary to conceptualize the El Niño phenomenon. In recognizing the experimental path for science, Galileo was a mental liberator, the founder of science as a method of knowledge [Bruce in *Biology of Belief* (2010)], considers evolution and its mechanisms a cooperative and instructive interaction, not as violent as Darwin, who he did not give value to the direct influence of the environment, food or climate – something that Jean Baptiste Lamarck, fifty years before Darwin had contemplated, expresses it. That is why adaptations to changing environments are a key issue in this article's thesis. Teodoro Wolff, a German scientist, studied the thermal influence in the pacific waters on the variety of fauna and flora unique to Galapagos Islands in 1875.

There are two systems of organization of society, i.e., of the peaceful cooperation of men: the bureaucratic organization, and the profit-based organization. Governance is an effect of both, coupled with citizen participation in legality and civic cooperation with mutual advantages. According to Rawls, "inclusive economic institutions also pave the way for two other drivers of prosperity; technology and education, which enable people through labor, land, and existing capital, accompanied by technological improvements, to become more productive." (Acemoglu, 2015, p. 99) Norberto Bobbio said that "a democratic state should be understood as that which is founded on a non-aggression pact between political groups and on the stipulation of rules that allow the peaceful resolution of conflicts between these groups" (Bobbio, 1997, p. 206). The principles of precaution and prevention are axes of a public policy and environmental governance in times of risks in climate change, and materialization of human rights (Mejía, 2014, p. 182).

It is not exhibitionism, nor fashion, it is not a matter of conjuncture, it is the very life of the earth with its inhabitants, among them the human intruder. It is the language on the territory for life, as he pointed out in his studies on culture (Gombrich, 2016, p. 161), when referring to Karl Popper's demand that individuals must have responsibility in the patterns of clarity in language. We would add the urgency to investigate the facts of nature, earth and environment.

In environmental history, in municipal studies of Quindío and Risaralda there is a need to differentiate between territory, territorialization and territoriality for public policy decision-making (Mejía, 2014, p. 21). Uncertainty, indetermination and complexity are matters of a triad of operational and conceptual governance (Chevalier, 2011; Morín, 2010, p. 126); deliberation is part of a language in citizen participation in defense and protection of habitat.

3.1. The global and the local in governance of interests

We perceive a desire to live in harmony with nature, as a special orientation of reconciliation with the earth, with the living being that sustains our lives. This conviction of deep reverence for life, integral and simple, in solidarity, cooperating in social relations with mutual advantages, is the reason for the reflections presented in this paper. It is not fully acceptable that in the present realities, developed nations manifest themselves in comprehensive hegemony and in generating strategies that consider them valid for all the actors of the globalization of pacts and processes of agreements concerning the environment.

The conditions of the ecosystems and the dimensions of geography produce substantial differences. In the context of the Americas, the differences indicate that in the tropics there are distinctive interrelationships that are at the same time segmented by the variety of climates, hydrography, topography and terrain.

If we add to the physical and geographic expressions the ways in which we have incorporated the territory, its resources, its productive capacities in the extractive and investment economic interventions, we will derive a greater capacity to understand the cycles of phenomena, the causes and effects that move us to analyze such perspectives of problems or opportunities for life.

In Colombia, the uses of the territory, its ownership and the distribution of its value can be evidenced in historical lines of appropriation and in the evolution of the institutions that have formulated the legal provisions that regulate the use, tenure and ownership of soils and natural resources. In such proportions of cycles of introduction, development and maturity of incorporations, we must review the indigenous modalities, the colonial ways and forms, the republican designs, related of course to the international dependencies and insertions that have suggested or shown the opportunities and responses of the entrepreneurial state, illegal, parastatal actors and the foreign speculative investment in search of the use of natural resources and the geostrategic possibilities of the Colombian nation.

In a recent writing, Mario Mejía states: "During the probable approaching glaciation, the population of the high latitudes will have to move towards the equatorial belt. I do not dare to imagine the human calamity that will occur on a global scale when all the covered ones unmask themselves to invade the equatorial zone, which will then be our land for them". Will only the fittest survive? Will the sublimation of the common will be imposed? Will the way be that of the imposition of material hegemonies, or that of the cultural, spiritual and intellectual growth of humanity? (Mejía, 2013).

3.2. A historical perspective, a fundamental political reason, and an essential administrative motive

The current moments of the administrative, political, social, economic and cultural life of the country require a balanced reflection, an innovative analysis

and a capacity of understanding that allows us to review and propose mechanisms of institutional organization for the fight against poverty, exclusion, the presence of illegal armed actors and drug traffickers and the continuation of a conflict that has already left more than 200,000 dead.

It is not unknown that there is a speculative phenomenon in the pricing of land in Colombia, with a view to provide the resource in the planting of palm, sugar cane, cassava and other agricultural goods for the production of biofuels, to position domains of use in mining, to favor groups of investors in road infrastructure, pipelines, electrification development, leisure housing in conurbations of high urban development and services. Some estimate that seventy percent of the planet's forests have already been cut down; others estimate eighty percent. With today's technical capacity to intervene in nature, the remaining percentage of forests has little time left. Causes are: domestic life, construction, livestock, agriculture, industrial uses: in short, the corporate plague.

Mechanisms that strengthen local public administrations and the participation of civil society in the formation of social capital that sustains an active and permanent public policy to fight unemployment, the lack of opportunities for the population, especially young people. On the fronts of the peaceful resolution of conflicts and the construction of the social rule of law, the framework of the constitutional legacy must be used. Research, discussion and proposals in the concepts of social and political networks invite us to interpret the ways to build a state that has as a substantial component the capacity to govern with efficiency, legitimacy and essential achievements in the solution of social problems prioritized in the framework of human rights.

Francis Fukuyama in his book, *State-Building: Governance and World Order in the 21st Century* (2004), states: "The ability to strengthen or create, from the ground up, state institutions and competencies that have hitherto been absent has come to occupy a priority place on the global agenda and has probably become an essential requirement for guaranteeing security in important parts of the world". The challenge in Colombia is that of governability, due to the vastness of the territory and the absence of a state, the presence of illegal armed actors united in drug trafficking, in mining exploitation with perverse purposes, corrupting people and authorities for destabilizing purposes.

The multiple elements that constitute statehood in Fukuyama's terms refer to the functions, capacities, and spheres of legitimacy of government. If there is something that delegitimizes states like Colombia today, it is the great manifestations of poverty, marginality, and social exclusion. The diagnosis tells us that twenty percent of the population in Colombia, that is, four million inhabitants, benefit from seventy percent of the Gross Domestic Product (GDP). Sixty percent of the rural population segments, more than six million people, are in a state of poverty. If the indicator of unsatisfied basic needs (UBN) is applied, fifty percent of the urban population is on the poverty line.

The Colombian diaspora that has had to emigrate to other countries has mainly done so due to the lack of internal opportunities to produce and create wealth. It has been estimated that more than four and a half million Colombians have emigrated to other countries. The contribution of these Colombians, with the remittances they send to the country, to the national economy and to the creation of effective demand is more than three and a half billion dollars, as real income that is applied to the payment of health services, education, acquisition and improvement of housing, and many times to initiate the activities of small service businesses and productive micro--enterprises.

3.3. The functions of the state and the governance of the territory

Bertrand Russell in his Philosophical Essays on History stated that: "It may be said, however, that the only true principle of selection is the purely scientific one; facts leading to the determination of general laws must be considered important. It is impossible to guess whether there will ever be a science of history". In any case, it is certain that such a science does not exist at present, except, to some slight degree, in the field of economics.

The efforts made by modern historians have allowed us to better understand the behavior of production systems, regularities, cycles, development dynamics and the presence of forms of constitution and expression of elites, actors, and interests. We start from the conception of constructive conflict based on the contributions of Mary Parker Follet, as a central element in the management of development. The contribution of this thinker, in the 1930s, made it possible to confront the weight of misery and hunger in the wandering of men and women suffering the rigors of the great economic depression, at least in the United States.

By discussing the trends of economic development on classical Keynesian and Schumpeterian theories, Amartya Sen (Indian Nobel laureate), manages to distance us from neo-liberal proposals, as a sign of the new international servitude, to venture into possibilities ranging from community governance to the restructuring of foreign debt payment and cooperation among nations. The liberal ideology of democratic construction of tolerance, the defense of freedom, respect for the contrary opinion, peaceful and equitable relations is the guide of the proposal that we introduce.

In terms of economic development, there are profound essays, analyses, and robust theories. In modern times we find valuable proposals and research that contribute to the understanding of economic, social, political, and cultural phenomena and to the processes of integration among nations. Among many studies, we must highlight the one on the frontier and current affairs contributed by Amartya Sen. Freedom and development are two pillars in the context of improving the material and spiritual conditions of human beings at all latitudes.

3.4. Western development theories and concepts. The options of the entrepreneurial capacity horizon

The following question is worthwhile as an approach to the section I am developing. Have we implemented development models, or have they been whispered to us? María Mercedes Cuéllar, produced an extraordinary research work called: Colombia, an unfinished project, values, institutions, and social capital. These seams of studies are a quarry to obtain questions and generate dense, difficult, problematic hypotheses. As Professor Julio Carrizosa Umaña – states, development models were invented to manage poor, developing, and underdeveloped countries. Keneth Kurihara in the 1970s taught us that the conditions of underdevelopment were expressed by the variables of technological backwardness, high rates of unemployment and structural underemployment, high income disparity, external indebtedness, and poor utilization of natural resources. It was erroneously believed that the official and private bureaucratic apparatuses had something to do with the inefficiency of the economy and the low level of social progress.

3.4.1. The rational and the reasonable in development

In the debate on the incidence of rationality in social decisions, I would add that, at the present time in Colombia, not only the rational but also the reasonable must prevail. John Rawls, the philosopher who left us in 2002, makes an extraordinary distinction between the rational, in the Kantian way, and the reasonable. Amartya Sen (1998) warns that in developed economies, where democracies are efficient, preventing hunger is a public policy priority. The famine expert teaches us that today, unlike in the times of Malthus, "any individual who does not have enough money to buy food goes into famine".

3.4.2. Dialogic of governance, citizen participation and consensus

From a development perspective, to reconcile social dialogue and civil dialogue, the relationship between participation in the policies of classist organizations and organizations of social diversity must understand the importance of listening to and respecting each other, The state as an essential actor must promote and encourage these changes, but a question arises... is it in a position to do so? I believe it is, but it must strengthen relations with civil society, listen to it, respect its rights, and ensure social welfare by protecting the fundamental and universal right that a human being has... his dignity, magnified in his Being and in his relations with the natural and environmental world around him. It is a quest and practice of social consensus, and (Canto, 2008), puts it in the following way: "greater efficiency in the processes of policy formulation implies that decision makers are able to adopt, at low cost, quality policies that meet high levels of social consensus, which are inserted within a line

of temporal projection for the country in the short, medium or long term", thus it is a call for the participation of all actors and sectors involved in the development of the country.

4. As a reflection

4.1. Networks as a strategy of local governance and as generators of productive synergies

This we know... "the earth does not belong to man, but man belongs to the earth. Man has not woven the web of life; he is only a strand of it. Whatever he does to the web he does to himself" (Chief Seattle's letter to the President of the United States in 1855).

It is important to define what a network is for the purposes of the discussion we propose as a horizon for research and innovation of public policy models to attack the problem of poverty and the restrictions to sustainable development. In the book *The Nature of Space* (Santos, 2000, p. 221), quoting Nicolas Curien (1988, p. 212) defines it as follows: "any infrastructure that allows the transport of matter, energy, information, is inscribed on a territory characterized by the topology of its access points or terminal points, its transmission arcs, its bifurcation or communication nodes".

The network is also social and political, it is the space where our research observation and the proposition of hypotheses and working conjectures are placed, it is built by people, by their messages, by the values and expectations that they themselves promote in the social, political, economic, and cultural relationships that take place in the localities. Networks can be understood from historical-genetic perspectives and from the present. In the first case, the study is diachronic and it is necessary to interpret the pieces, their moments, their contexts, their dates, established or present with diverse qualities and that no longer manifest themselves in the same way. Historical reworking and the description of genotypes is not easy, however it is necessary to do it. In the development of the indigenous AYLLU in our America, the concepts of community work, cooperation and solidarity were developed under the government of powerful chiefdoms, with organizational verticality and subjugation of less politically and economically developed peoples. The structure of communication networks, messengers and the distribution of privileges is legendary. It is said that the Inca consumed fresh fish every day in the center of the empire, sea fish from the coast. Today, with cold chains, integrated marketing and processing networks, the transit of fish to regional markets is sometimes difficult. In geography we speak of circuits to refer to natural systems. In psychology as well as in geography (Raffestin, 1980), we have used the concepts of reticulated space (Fischer, 1980, p. 28) cited by

Santos (2000, p. 222) concepts that come from a deliberate construction of living spaces, which respond to the stimuli of human material and spiritual production.

In the acceptance of the word in the social and exact sciences and in everyday life, the word, the concept, and the idea of network popularize and vulgarize many inaccuracies and ambiguities. In the specific case of the research, we captured a use of synergistic characteristics, institutional cooperation, functional alliances of municipalities and civic solidarity.

Follet, in his work *The New State* (2016), warned in setting out the ideas of democratic government, that this would not be achieved through the rhetorical and ritual transfer of formalized powers; democratic authority would have to be created by the people themselves. In general terms, he advocated the replacement of bureaucratic institutions by networks of groups, which would allow the people themselves to analyze their problems, and then produce and implement their own solutions. This is true democracy, each individual participating in the decision-making process and accepting personal responsibility for the results. In his words: "We only find the true man through the organization of groups. The potentialities of the individual remain as such until such time as they are released through group life, therefore the essence of democracy is creation. The technique of democracy is the organization of groups".

The integration of interests as a network principle is not sufficiently recognized and applied in practice by lawyers and economists, just as political scientists have not accepted the principle of integration of powers, and some authors in reference to civil society and development, warn that contemporary academic research coincides with the interest to establish the relationship between the institutions where collective relations are taken, state, supranational bodies, regions and municipalities, organizations, associations, corporations, societies and the market-coordination mechanism where economic interests are carried out.

Bibliography

Acemoglu, D. & Robinson, J. (2015). *Porque fracasan los países. Los orígenes del poder, la prosperidad y la pobreza*. Editorial Deusto. Décima edición, 608 pp.

Bobbio, N. (1997). *El futuro de la democracia. Fondo de cultura económica*. México. Tercera edición, 214 pp.

Canto, M. (2008). Gobernanza y participación ciudadana en las políticas públicas frente al reto del desarrollo. *Política y cultura*, 30, 9–37. Documento electrónico, http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0188774220080002000002&lng=es&tlng=es (access: 23.10.2020).

Chevalier, J. (2011). El Estado Posmoderno. Bogotá: Universidad Externado de Colombia, 443 pp.

Child, J. (1997). *El conflicto constructivo, en Mary Parker Follet, precursora de la administración*. Editorial McGrawhill, p. 87–95.

Clark, J.L. (1985). "Thus Spoke Chief Seattle: The Story of An Undocumented Speech", in the US National Archives' Prologue Magazine, 18(1), https://www.archives.gov/publications/prologue/1985/spring/chief-seattle.html.

Crosby, A. (2004). *Imperialismo ecológico: la expansión biológica de Europa, 900–1900*. Editorial Prensa Universidad de Cambridge, 368 pp.

Cuéllar, M. (2000). *Colombia un proyecto inconcluso, valores, instituciones y capital social*. Universidad Externado de Colombia, 986 pp.

Curien, N. (1988). D'une problématique générale des réseaux a l'analyse économique du transport des informations. In: G. Dupuy, *Réseaux territoriaux*. Caen: Paradigme, pp. 211–228.

Erickson, F. (1989). Métodos cualitativos de investigación sobre la enseñanza. In: M.C. Wittroc, *La investigación en la enseñanza. Métodos cualitativos y de observación*. Barcelona: Editorial Paidós, pp. 195–301.

Fischer, G.N. (1980). *Espace industriel et liberté, l'autogestion cladestine*. Paris: PUF.

Follett, M.P. (2016). *The New State: Group Organization the Solution of Popular Government*. Eastford: Martino Fine Books, pp. 404.

Fukuyama, F. (2004). *State-Building: Governance and World Order in the 21st Century*. Cornell University Press, 160 pp.

Fung, A., Wright, E.O., & Abers, R. (2003). *Democracia en profundidad: Nuevas formas institucionales de gobierno participativo con poder de decisión*. Bogotá: Universidad Nacional de Colombia, Facultad de Derecho, Ciencias Políticas y Sociales.

Gombrich, E. (2015). *Breve historia del mundo*. Ediciones Península, 352 pp.

Gombrich, E. (2016). *Breve Historia de la Cultura*. Bogota: Booklet.

Gombrich, E.H. (2004). *Breve historia de la cultura*. Bogotá: Editorial Ariel.

Lovelock, J. (2007). *La venganza de la tierra: la teoría de Gaia y el futuro de la humanidad*. Barcelona: Planeta.

Lovelock, J. (2007). *The Revenge of Gaia: Why the Earth is Fighting Back – and How we Can Still Save Humanity*. London: Penguin Books.

Ludwing, V. (2017). *Burocracia. Gestión empresarial frente a gestión burocrática*. Madrid: Unión editorial.

Martins, F. & Stracuzzi, P. (2006). *Metodología de la investigación cualitativa. Editorial FEDUPEL*. Segunda Edición, 253 pp.

Mejía, G.M. (2016). *Sendas. Hacia Taos Agrícolas alternativos*. Editorial Create Space Independent Publishing Platform.

Mejía, J. (2014). *Municipio y Política ambiental. Un estudio de casos en el departamento del Quindío*. Escuela Superior de Administración Pública, Pereira. Escuela Superior de Administración Pública. Manizales.

Mejía, J. (2017). *La Universidad Republicana y laica en Colombia 1886/1924*. Bogotá: Escuela Superior de Administración Pública.

Mejía, J., Valencia, J., Munevar, C., Muñoz, E., Aguirre, A., García, C., Alvarez, J., Arango, B., Rios, M., Guzmán, A., Díaz, C., Mejía, A., García, D., Pulgarín, J. (2014). *Cambio climático y desplazamiento ambiental forzado. Estudio de caso en la Eco región eje cafetero de Colombia*. Escuela Superior de Administración Pública, Universidad de Caldas y otras. Primera Edición. Editorial universitaria la Gran Colombia. Documento electrónico, https://www.ugc.edu.co/sede/armenia/files/editorial/cambio_climatico_desplazamiento_ambiental.pdf (access: 17.09.2020).

Mejía, M. (2012). Cambio climático y afectación a la agricultura. *Revista Semillas*, 46(47). Documento electrónico, https://www.semillas.org.co/es/revista/46-47 (access: 14.10.2020).

Mejía, M. (2013). *Bien Vivir: La sociedad futura*. CreateSpace Independent Publishing Platform, pp. 320.

Mejía, M. (2016). *Sendas: hacia taos agrícolas alternativos*. CreateSpace Independent Publishing Platform.
Mill, J.S. (2002). *On liberty*. Mineola, NY: Dover Publications.
Morín, E. (2010). *Hacia el Abismo, Globalización en el siglo XXI*. Madrid: Ediciones Paidos, 180 pp.
Palella, S. & Martins, F. (2004). *Metodología de la Investigación Cuantitativa*. UPEL: Caracas.
Parker, M. (1998). *The New State: Group organization, the solution of popular Government*. Editorial. Prensa de Penn State.
Rawls, J. (1998). *Liberalismo político*. Editorial crítica, 448 pp.
Santos, M. (2000). *La Naturaleza del Espacio. Técnica y Tiempo. Razón y Emoción*. Barcelona: Ariel, pp. 352.
Sen, A.K. (1998). Las teorías del desarrollo a principios del siglo XXI. Cuadernos de Economía, 17(29), 73-100, https://revistas.unal.edu.co/index.php/ceconomia/article/view/11497.
Taylor, S.J. y Bogdan R. (1997). *Introducción a los métodos cualitativos de investigación. La búsqueda de significados*. Ediciones Paidós. España, 301 pp.

Abstract

Environmental governance in south-central Caldas, a reflection on public policy for risk management

This article on environmental governance in the Colombian territory contributes to the preservation of life, in a moment of pandemic and health threat by a virus that shapes a new way of coexistence. Governance in terms of the implementation of environmental public policies must be concerned with the preservation of air, water, and healthy food. Governance in today's sense involves citizen participation and public eligibility. In the case of the southern center of Caldas, especially in what is considered as a future metropolitan area, it is essential to establish strategies for the maintenance of watersheds, to emphasize reforestation projects, to measure the climate as an instance of scientific understanding of climate change, to mitigate, adapt and resolve disaster management, associated with the phenomena of El Niño, La Niña, and the notorious instabilities of the hillside soils. Constructive conflict must prevail in the agreements of actors and their interests. Public institutions, private companies, citizen organizations must have their say in the new deal. In today's world, as a central element in the management of development, the construction of consensus based on the public eligibility of the constitutional norm that directs the social contract needs to be worked on.

Keywords: institutions, environment, governance, consensus, participation, climate change

Infrastructure megaprojects observed: "the Grid" and "the Prophecies"[1]

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> Power no longer resides in the institutions (...) power now resides in the infrastructures of this world. (...) If struggles against big infrastructure projects are multiplying all over the world, from Romania to Brazil, it's because this intuition itself is becoming widespread.
>
> The Invisible Committee (2015)

The infrastructure consensus

The financial crisis of 2008–2009 opened the doors for the so-called Infrastructure Consensus. The world's biggest economies launched their respective recovery plans based mainly on large infrastructure projects[3] (Lin, Doemeland, 2012; Cowen, 2014, Dodson, 2017; The Economist, 2017; Talking Infrastructure, 2020). Subsequently, in 2013 China reinforced this trend with the launch of its multi-million dollar global strategy called the Belt and Road Initiative (Miller, 2017). Also in Latin America, governments renewed their commitment to the implementation of regional mega-corridors such as the IIRSA[4] and the Mesoamerica Integration and Development Project (PM)[5]. As an example, just

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[3] We can take, as examples, the European Economic Recovery Plan, the American Recovery and Reinvestment Act, the Chinese Economic Stimulus Plan, and the Brazilian Growth Acceleration Program (PAC).

[4] The Initiative for the Integration of the Regional Infrastructure of South America.

[5] The successor to the Puebla-Panama Plan (PPP).

in the Central American region (335,547 km^2), the construction of as many as 381 new large hydroelectric plants has been proposed (Burgués Arrea, 2008; Sánchez, 2008; Barbier et al., 2019).

The issue of financing megaprojects ("From Billions to Trillions") has taken over the agenda of the G20, and the recently constituted BRICS, as well as of the development banks (especially, in the framework of the Global Infrastructure Forum). The financial derivatives market has identified infrastructure as a very promising new "liquid global asset class" (Dodson, 2017; Söderlund et al., 2017; Sol, 2019). As a result, in 2014 the investment in megaprojects reached a record annual total, estimated between 6 and 9 trillion dollars, approaching 8% of the global GDP[6],[7] (Flyvbjerg, 2014; McKinsey, 2016). Most of this sum came from public money, which continues to be essential, not only to finance the works directly, but also to assume the risk ("de-risk") in the case of the Public-Private-Partnership formula (Söderlund et al., 2017; Sol, 2019).

It is worth mentioning that, according to the UNCTAD, an amount equivalent to 5-7 trillion dollars per year would allow financing the achievement of the entire set of 17 Sustainable Development Goals (UN, 2018). In turn, the FAO estimated that with a budget of $ 267 billion per year it would be possible to eradicate hunger, which in 2015 still affected 10.6% of the world's population. "Given that this is more or less equivalent to 0.3 percent of the global GDP, I personally think it is a relatively small price to pay to end hunger", said the then-director general, José Graziano da Silva (FAO, IFAD, WFP, 2015). Despite the numerous dilemmas that derive from these rhetorical counterpoints, the Infrastructure Consensus is rarely analyzed systematically in terms of the consequences that it brings for Agenda 2030 in its various economic, social, and environmental components (Söderlund et al., 2017; Sol, 2019).

"Are big infrastructure projects castles in the air or bridges to nowhere?" asked John O'Sullivan from "The Economist" (2017). Are massive investments in megaprojects the acclaimed "magic bullet" for our current multidimensional crisis? Or perhaps, by analogy to the concept of "bullshit jobs" formulated by David Graeber[8] (Graeber, 2018), we should speak of "bullshit projects", or "Grands projets inutiles et imposés (GPII)" (EJOLT, 2013; The Conversation, 2018), which rather hijack the political agenda and public money while delaying the transition to a more sustainable world-system?

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[6] Whereas McKinsey Global Institute calculates global infrastructure spending (in the narrow sense of the term) at 4% of total global GDP, Flyvbjerg's estimate (8%) includes also mega-construction projects in areas such as defense and extractive industries.

[7] Thomas Frey (Da Vinci Institute), has even gone as far as to project a future scenario of up to 24% of global GDP.

[8] David Graeber (1961–2020) was a professor of anthropology at the London School of Economics, a leading figure in the Occupy Wall Street movement, credited with having coined the slogan "We are the 99%".

The socio-economic dilemmas

The classic IADB definition[9] (BID, 2000), dissected the infrastructure in two separate sets of goals:

The "social" infrastructure places particular emphasis on the satisfaction of "basic needs", the socio-productive inclusion of the disadvantaged groups, and a greater cohesion of the internal market. As an example, we can put the construction and equipping of educational and public health centers, drinking water and sanitation facilities, or paved roads that connect rural communities through public transport with nearby towns and cities (BID, 2000; Sánchez, 2008; Illescas Arita, 2012).

The economic or "competitive" infrastructure takes the form of transportation, energy, and telecommunications corridors that facilitate the expansion of agribusiness, mining, and industrial chains, and the better integration of peripheral areas with global markets. It is a form of subsidy to large national and transnational investors under the assumption that there will be a "spill-over effect" that will irrigate the local economy (BID, 2000; Sánchez, 2008; Illescas Arita, 2012; NYDF, 2020).

These logics, however, do not apply, when an infrastructure megaproject does not emerge from local demand but is imposed as a sink for excess low-cost capital. Such a ("bullshit") project may not make any sense from the point of view of the affected communities (e.g. a "road to nowhere" or a "ghost city"). Its sole objective is to feed the logic of the financialization that progressively diverts capital from productive to financial investments. A growing number of pension funds and sovereign wealth funds "switch" from productive investment into built environments. It is a way to diversify the portfolio of assets, reduce its volatility amid the present uncertainty, and cushion the risks of participation in doubtful projects through the guarantees granted by the host state (Bazi, Firzli, 2011; Weber et al., 2016; Dodson, 2017; Dowbor, 2017).

If we analyze large infrastructure plans in Latin America such as the IIRSA and the PM from the perspective of Wallerstein's world-systems theory, they tend to deepen the extractive and centrifugal neocolonial model, with the inevitable reprimarization of the economy, and lead to a "growth without development" trap (Wallerstein, 2004; Sol, 2019).

In theory, the Mesoamerica Project consists of measures to improve both "competitiveness" (transport, energy, telecommunications) and social development (health, environmental protection, popular housing, combating poverty and hunger). In practice, however, highway and hydroelectric megaprojects consume 92% of available resources, and human development issues are put on the back burner (Sánchez, 2008; Illescas Arita, 2012; Herrera Rodríguez, 2016).

[9] The infrastructure is "a set of long-life engineering structures and facilities that constitute the basis on which the provision of services considered necessary for the development of economic and social purposes occurs".

The department of Alta Verapaz (Guatemala) stands out for its very high density of hydroelectric megaprojects (built or planned), as well as for one of the worst electrification rates in the Western Hemisphere. In 2016 only 44% of the population had access to electricity (compared to the national average of 92%) (UNDP, 2017; Aupi, Mantxo, 2019). The department also constitutes the backbone of the highway megaproject known as the Franja Transversal del Norte (FTN). The FTN designed as the integration corridor, which would extend from the border with Honduras to the Mexican state of Chiapas, is one of the most emblematic cases of "accumulation by dispossession"[10], corruption and state violence (Solano, 2012; Rogers, 2013; Barreto, 2018; Ola, Barreto, 2019, Morales Rodas, 2020).

Among the Mayan and Mestizo communities that live along this unfinished highway, a quasi- unanimous consensus has formed against mega-infrastructure projects of all kinds. The resistance includes both peaceful measures (demonstrations, plebiscites) and direct action (massive illegal electricity connections, occupation and sabotage of plants, burning of machinery, etc.) (Solano, 2012; Ceppas, 2017; Aupi, Mantxo, 2019). As a result, in 2017, the annual losses of the energy distribution company (Energuate) from illegal connections amounted to over $ 50 million (mostly in FTN departments). On the country level, the negative impact of the increase in social polarization on the economy is estimated at 6.7% of GDP (Castillo, 2018; Palacios, 2018).

Although numerous studies confirm that public investment in large infrastructure projects does have a positive impact on GDP, this does not occur automatically. For that to happen, several conditions must be met, such as good timing and targeting of the sectors with greater capacity to respond to the stimulus (Aschauer, 1990; Munnell, 1990; Gechert, 2013; Whalen, Reichling, 2015; Tax Policy Center, 2020).

Furthermore, if the main objective is not mere GDP growth, but social cohesion, the range of criteria to be taken into account is considerably widened (BID, 2000; Söderlund et al., 2017; Ward, Skayannis, 2019). To begin with, there must be a high degree of coherence between various infrastructure projects that are being planned and implemented in the same territory. Instead of becoming an enclave surrounded by electric fences and armed guards, it must proactively generate synergies with other actors and sectoral policies (BID, 2000; Ward, Skayannis, 2019). A road or a dam cannot be decontextualized units of extraction of the social surplus (dividends), nor can the inhabitants of the affected area be treated as second-class citizens (Illescas Arita, 2012; Dodson, 2017; Barbier et al., 2019).

The infrastructure must be oriented towards the greatest possible redistributive effect in terms of royalties, complementary projects, local employment, and purchasing policies, and not reduced to optimizing expenses and widening the profit margin. For example, an energy investment that affects the

[10] The concept was formulated by David Harvey.

public transport sector will have greater effects on low-income sectors than the one related to the aluminum industry. In the first case, the relationship is direct (investment-beneficiary) while in the second it is indirect (investment-job-beneficiary), and it also has a low occupancy rate in relation to the quantity of energy consumed (Honty, 2006; Ward, Skayannis, 2019; Sol, 2019).

On paper, it would not be entirely impossible to draw up a minimal plan for "citizen infrastructure", which does not create a gap between the "economic" and the "social", and remains fully accountable to local communities, and immune to the extractive and short-term vision of financial markets. In practice, however, these small steps would represent a giant leap for local national elites and transnational megaprojects lobby.

The elusive quest for sustainability

The Infrastructure Consensus, as a growth-lifting strategy, runs counter to key items on the environmental agenda such as the sustainable management of aquatic ecosystems or climate change adaptation. And it will not be easy to decouple, as construction and maintenance of infrastructure currently account for more than 60% of greenhouse gas emissions. Apart from their direct impact, megaprojects frequently reinforce life and business models considered highly unsustainable: consumerism, extractivism, and transportation based on fossil fuels (Corfee-Morlot et al., 2016; Hall et al., 2019; Sturup, Low, 2019).

The development banks and numerous think tanks have elaborated complex transition scenarios[11] towards the so-called "sustainable infrastructure": "planned, designed, constructed, operated, and decommissioned in a manner to ensure economic and financial, social, environmental (including climate resilience), and institutional sustainability over the entire life cycle of the project" (BID, 2018; Ward, Skayannis, 2019).

Although there are cases where these recommendations have been taken, at least partially, into account, they are far from constituting a relevant critical mass within the sector. In an extensive comparative study of megaprojects carried out by the UCL Omega Center[12]: 93% of them could not be identified as having followed sustainable development principles in any significant manner. The researchers consider that the roots of this divergence lie largely in "a lack of a shared vision of what sustainable development means". There are still fundamental ontological, epistemological, discursive, and operational gaps on what is sustainable and what is not concerning megaprojects (Ward, Dimitriou, 2010; Hall et al., 2019; Sturup, Low, 2019; Ward, Skayannis, 2019).

As a classic example of such an "apple of discord", we can cite the endless "bigger is better" vs. "small is beautiful" debate. On the one hand, Kohr and

[11] The IADB matrix is made up of 66 indicators (BID, 2018).

[12] See the project website: http://www.omegacentre.bartlett.ucl.ac.uk.

Schumacher denounced "megalomania" as the manifestation of hubris, the inability to limit oneself in a finite environment: "Wherever something is wrong, something is too big". Therefore, infrastructure projects must respect the human scale, apply "appropriate technologies", and decentralize/democratize their management and use (Kohr, 1957; Schumacher, 1973).

On the other hand, Atkinson and Lind in "Big is beautiful" (2018) warn of a "blind megalophobia": "If small is beautiful, big is ugly. Indeed, if you want to demonize something today, simply put the word «big» in front of it" ["Big Government", "Big Pharma", "Big Oil", "Big Tech", (banks) "too big to fail", etc.]. For the authors, the political discourse that stigmatizes the "large and successful organizations" is misguided. The problem does not necessarily lie with the "mega" dimension of any particular project. It may have more to do with the predatory logic in which it is inserted. Without changing these underlying rules of the game, the aggregate effect of the smaller units could just lead to the same dire consequences.

The manufactured landscapes

"It is interesting to note that despite all the negative performance that megaprojects have purportedly had, surprisingly, more and more of them are being built" (Flyvbjerg, 2003). According to the IMF, "less than 1 in 1,000 megaprojects achieve their promised business outcomes" (Australian Constructors Association, 2015). Lins Ribeiro and Flyvbjerg tend to explain the rationale behind this "megaproject paradox" in terms of "discourse and power" (Lins Ribeiro, 2013; Flyvbjerg, 2014).

Like the Seven Wonders of the Ancient World, today's mega-engineering challenges the limits of nature, and projects power. This "landscape rhetoric" materializes the macro-discourse that announces the arrival of a new political and economic order (Marsh, Jones, 2011; Larkin, 2013). Therefore, the paradox is only apparent: "these projects are planned and executed for a symbolic value that may well exceed their nominal fiscal value" (Marsh, Jones, 2011).

Viae Romanae expanded *limites* of the empire. Immense cathedrals consolidated the government of souls. Mega-dams in Nehru's India and Nasser's Egypt invoked the majestic temples of antiquity and promised a glorious future for nations breaking free from the colonial yoke (Salvatore, 2006; Marsh, Jones, 2011; Sneddon, 2015). In the same way, in the great works that sought the physical interconnection of the Americas ("by the right of our manifest destiny to overspread and to possess the whole of the continent"), references to the pyramids (The Panama Canal), and the Roman roads (the Pan-American Highway) abounded (O'Sullivan, 1845; Adas, 2006; Salvatore, 2006; Rutkow, 2019).

At present, the metaphor of the Euroasian interconnection is built around the image of The Silk Road. In the opinion of Tom Miller, author of the book

"China Asian Dream", Chinese functionaries admit unofficially that, in the context of the Belt and Road Initiative, they expect losses of 30% on investments in Central Asia, and almost 80% in Pakistan. But in this geopolitical construction race, the important thing is not how much is spent, but who will build the highway or the bridge. And whose story wins (Miller, 2017).

On the other hand, the authors of the essay "Large Dam Development..." (Zwarteveen et al., 2017) suggest that the vision of megaprojects as "Trojan Horses" of a certain empire no longer holds, as the infrastructure increasingly operates as an interdependent "system-of-systems". Rather, we should speak of the "Pandora's Box" of financialization, and "logisticality", which no one understands anymore in its entirety (Cowen, 2014; Zwarteveen et al., 2017; Cuppini, Frapporti, 2018; Lovbrand et al., 2020).

The infrastructures are now "conceptualized not only as a means to sustain life but as a lively system in itself" (Tsing, 2005; Cowen, 2014; Rossiter, 2016). Faustian alchemical dream of transcending existential limits would thus be realized progressively: to conquer time and space by exercising full dominion over nature as "Lord and commander of the elements" (Marlowe, 2008).

And we see the outcome in Edward Burtynsky's works[13], which in a zoom-in-and-out movement immerse us in the "Manufactured Landscapes", corridors, and "no-places" of the "Anthropocene". And the "Qatsi" trilogy by Godfrey Reggio[14], which shows us the synchronization of global time in a "no-time" of "just-in-time", which substitutes natural rhythms and cycles.

Its frenetic time-lapse footage of dams, highways, terminals, power lines, assembly lines converge-diverge with the powerful soundtrack of Philip Glass that oscillates between the world of "The Grid" and the world of (the Hopi) "Prophecies"[15]. The Infrastructure is presented as a "constitution" of globalization processes where water, land, energy, air, and the Internet connections produce new overwhelming chronotopes (Augé, 1993; Cowen, 2014; Rossiter, 2016; Mezzadra, Neilson, 2019).

"All the hypocritical proclamations about the sacred character of the «environment», the holy crusade for its defense, can only be understood in light of this mutation: power has become environmental itself, has merged into the surroundings. It is power that we're asked to defend in all the official appeals to «preserve the environment», and not the little fish" (The Invisible Committee, 2015).

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[13] See Eduard Burtynsky and Jennifer Baichwal documentaries: Manufactured Landscapes (2006), Watermark (2013), Anthropocene: The Human Epoch (2018). https://www.edwardburtynsky.com.

[14] See Godfrey Reggio "Qatsi" trilogy: "Koyaanisqatsi: Life Out of Balance" (1982), "Powaqqatsi: Life in Transformation" (1988), "Naqoyqatsi: Life as War" (2002).

[15] "The Grid" and "Prophecies" constitute two key musical themes from "Koyaanisqatsi: Original Soundtrack Album from the Film" by Philip Glass.

Bibliography

Adas, M. (2006). *Dominance by design: technological imperatives and America's civilizing mission*. Cambridge, MA: Harvard University Press.

Aschauer, D.A. (1990). Why is infrastructure important? Accessible at: https://www.bostonfed.org/-/media/Documents/conference/34/conf34b.pdf (access: 30.12.2020).

Atkinson, R., Lind, M. (2018). *Big Is Beautiful: Debunking the Myth of Small Business*. Cambridge, MA: MIT Press.

Augé, M. (1993). *Los "no lugares". Espacios del anonimato*. Barcelona: Gedisa.

Aupi, A., Mantxo, M. (2019). *Transición Energética y Democracia: Energía en Guatemala: del genocidio a la transición comunitaria*. Bilbao: Universidad del País Vasco.

Australian Constructors Association (2015). Changing the game. How Australia can achieve success in the new world of Mega-projects. Accessible at: https://www.constructors.com.au/wp-content/uploads/2019/11/Changing-the-Game-Mega-Projects-Final1.pdf (access: 30.12.2020).

Bailey, T. (2015). Are megaprojects worth the money? Accessible at: https://www.worldfinance.com/infrastructure-investment/are-megaprojects-worth-the-money (access: 30.12.2020).

Barbier, C., Cuny, C., Raimbault, N. (2019). Finance, extraction and logistics as axes of the third neoliberal moment in Latin America. *Work Organisation, Labour & Globalisation*, 13(1), 47–78.

Barreto, B. (2018). La trama ilegal detrás de la ruta Franja Transversal. Accessible at: https://www.prensalibre.com/guatemala/comunitario/la-trama-ilegal-detras-de-la-ruta-franja-transversal (access: 30.12.2020).

Bazi, V., Firzli, M., Nicolas J. (2011). Infrastructure investments in an age of austerity: The pension and sovereign funds perspective. *Revue Analyse Financiere*, 41, 34–37.

BID (2000). Un nuevo impulso a la integración de la infraestructura regional en América del Sur. Accessible at: https://publications.iadb.org/publications/spanish/document/Un-Nuevo-Impulso-a-la-Integraci%C3%B3n-de-la-Infraestructura-Regional-en-Am%C3%A9rica-del-Sur.pdf (access: 30.12.2020).

BID (2018). What is Sustainable Infrastructure: A Framework to Guide Sustainability Across the Project Cycle. DOI: 10.18235/0001043.

Burgués Arrea, I. (2008). Inventario de Proyectos de Infraestructura en Mesoamérica. The Nature Conservancy & Conservation International. Accesible at: https://www.conservation-strategy.org/publication/inventario-de-proyectos-de-infraestructura-en-mesoamerica (access: 30.12.2020).

Castillo, M. (2018). *Impacto de la conflictividad social en las operaciones de ENERGUATE*. Guatemala: CNEE.

Ceppas (2017). Consultas comunitarias en Guatemala. Accessible at: https://ceppas.org.gt/infografia-consultas-comunitarias-en-guatemala (access: 30.12.2020).

Corfee-Morlot, J., Rydge, Ja., Gencsu, I., Bhattacharya, A. (2016). The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The New Climate Economy. DOI: 10.13140/RG.2.2.12364.00640.

Cowen, D. (2014). *The deadly life of logistics: mapping the violence of global trade*. Minneapolis: University of Minnesota Press.

Cuppini, N., Frapporti, M. (2018). Logistics Genealogies: A Conversation with Stefano Harney. Social Text, 136, 36, DOI: 10.1215/01642472-S6o91c7ia80l2T.

Dodson, J. (2017). Making sense of the global infrastructure turn. Accessible at: https://theconversation.com/making-sense-of-the-global-infrastructure-turn-73853 (access: 30.12.2020).

Dowbor, L. (2017). *A era do capital improdutivo: Por que oito famílias tem mais riqueza do que a metade da população do mundo?* São Paulo: Autonomia Literária.

EJOLT (2013). Large Useless Imposed Projects. Accessible at: http://www.ejolt.org/2013/07/large-useless-imposed-projects (access: 30.12.2020).
FAO, IFAD, WFP (2015). Achieving Zero Hunger: Combining social protection with pro-poor investments. Accessible at: http://www.fao.org/news/story/en/item/297804/icode (access: 27.04.2021).
Flyvbjerg, B. (2003). *Megaprojects and Risk: An Anatomy of Ambition*. Cambridge: Cambridge University Press.
Flyvbjerg, B. (2014). What You Should Know about Megaprojects and Why: An Overview. *Project Management Journal*, 45(2), 6–19, DOI: 10.1002/pmj.21409.
Frey, Th. (2017). Megaprojects Set to Explode to 24% of Global GDP Within a Decade. Accessible at: https://futureofconstruction.org/blog/megaprojects-set-to-explode-to-24-of-global-gdp-within-a-decade (access: 30.12.2020).
Gechert, S. (2013). What fiscal policy is most effective? A Meta Regression Analysis. IMK Working Paper, No. 117. Accessible at: http://nbn-resolving.de/urn:nbn:de:101:1-201403119027 (access: 27.04.2021).
Gilman, N. (2003). *Mandarins of the Future: Modernization Theory in Cold War America*. Baltimore: Johns Hopkins University Press.
Graeber, D. (2018). *Bullshit Jobs: A Theory*. New York: Simon & Schuster.
Hall, J., Aerts, J., Hallegatte, S., Koks, E., Ward, Ph. (2019). Adaptation of Infrastructure Systems: Background Paper for the Global Commission on Adaptation. Oxford: Environmental Change Institute.
Herrera Rodríguez, O. (2016). Terror de Estado y Guerra Global contra el Terrorismo Explicación sobre el origen y la constitución de leyes antiterroristas en Centroamérica entre el 2001 y el 2015. Heredia: UNA.
Honty, G. (2006). Energía en Sudamérica: una interconexión que no integra. *Nueva Sociedad*, 204, 119–135.
Illescas Arita, G. (2012). Qué son los megaproyectos? Ensayo teórico sobre su carácter e implementación en el modelo de acumulación capitalista en Guatemala. *El Observador*, 7–8(38–39), 5–41.
Kaparos, G., Skayannis, P. (2007). *The challenge of social cohesion in MUTPs' planning*. London: OMEGA Centre, UCL.
Kohr, L. (1957). *The Breakdown of Nations*. New York: Routledge & K. Paul.
Larkin, B. (2013) The Politics and Poetics of Infrastructure. *Annual Review of Anthropology*, 42, 347–343.
Lin, J., Doemeland, D. (2012). Beyond Keynesianism: Global Infrastructure Investments in Times of Crisis. Journal of International Commerce, Economics and Policy, 03, DOI: 10.1142/S1793993312500159.
Lins Ribeiro, G. (2013). Global Flows of Development Models. *Anthropological Forum*, 23(2), 121–141, DOI: 10.1080/00664677.2013.767183.
Lovbrand, Ev., Mobjork, M., Soder, R. (2020). The Anthropocene and the geo-political imagination: Re-writing Earth as political space. Earth System Governance, 4, DOI: 10.1016/j.esg.2020.100051.
McKinsey Global Institute (2016). Bridging-Global-Infrastructure-Gaps. DOI: 10.13140/RG.2.2.26758.37440.
Marlowe, Ch. (2008). *Doctor Faustus and Other Plays*. Oxford: Oxford University Press.
Marsh, B., Jones J. (2011). Building the Next Seven Wonders: The Landscape Rhetoric of Large Engineering Projects. In: S.D. Brunn (ed.). *Engineering Earth: The Impacts of Megaengineering Projects* (13–36). New York: Springer Science+Business Media B.V.
Mezzadra, S., Neilson, B. (2019). *The politics of operations: Excavating contemporary capitalism*. Durham: Duke University Press.

Miller, T. (2017). *China's Asian Dream: Empire Building along the New Silk Road*. New York: Zed Books.

Morales Rodas, S. (2020). Ejército ya no concluirá último tramo de la Franja Transversal del Norte. Accessible at: https://www.prensalibre.com/guatemala/comunitario/ejercito-ya-no-concluira-ultimo-tramo-de-la-franja-transversal-del-norte (access: 30.12.2020).

Munnell, A. (1990). Why has Productivity Growth Declined? Productivity and Public Investment. Accessible at: http://www.bos.frb.org/economic/neer/neer1990/neer190a.pdf (access: 30.12.2020).

NYDF Assessment Partners (2020). Balancing forests and development: Addressing infrastructure and extractive industries, promoting sustainable livelihoods. Accessible at: www.forestdeclaration.org (access: 30.12.2020).

Ola, A.L., Barreto, B. (2019). Capturan en Bulgaria a israelí Azayira Levy, por caso de Corrupción y Construcción Fase II. Accessible at: https://www.prensalibre.com/guatemala/justicia/capturan-en-bulgaria-a-israeli-azayira-levy-por-caso-de-corrupcion-y-construccion-fase-ii (access: 30.12.2020).

O'Sullivan, J.L. (1845). Annexation. *United States Magazine and Democratic Review*, 17(1), 5–10.

Palacios, B. (2018). CABI estima en Q6.5 millardos el impacto económico de la conflictividad social. Accessible at: https://republica.gt/2018/10/10/cabi-estima-en-q6-5-millardos-el-impacto-economico-de-la-conflictividad-social (access: 30.12.2020).

Pretorius, F., Ng, M.K. (2008). *Mega urban transport and development projects: The challenge of embedding sustainability in evaluating project viability. Omega Centre Working Paper*. London: UCL.

Rogers, O.J. (2013). *Abriendo brechas. El proyecto vial de la Franja Transversal del Norte, desarrollo y territorio en Huehuetenango*. Huehuetenango: CEDFOG.

Rojas Navarrete, M. (2017). *Estadísticas del subsector eléctrico de los países del Sistema de la Integración Centroamericana*. México D.F.: CEPAL.

Rossiter, N. (2016). *Software, Infrastructure, Labor: A Media Theory of Logistical Nightmares*. New York: Routledge.

Rutkow, E. (2019). *The Longest Line on the Map: The United States, the Pan-American Highway, and the Quest to Link the Americas*. New York: Scribner.

Salvatore, R. (2006). Imperial Mechanics: South America's Hemispheric Integration in the Machine Age. *The American Quarterly*, 58(3), 662–691.

Sánchez, F.V. (2008). Elementos para una geopolítica de los megaproyectos de infraestructura en América Latina y Colombia. *Cuadernos de Geografía*, 17, 7–22.

Sassen, S. (2006). *Territory, Authority, Rights: From Medieval to Global Assemblages*. Princeton, NJ: Princeton University Press.

Schumacher, E.F. (1973). *Small Is Beautiful: Economics as if People Mattered*. London: Blond & Briggs.

Scott, J.C. (1999). *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press.

Sneddon, Ch. (2015). *Concrete Revolution: Large Dams, Cold War Geopolitics, and the US Bureau of Reclamation*. Chicago: University of Chicago Press.

Sol, X. (2019). Rebuilding the world: the hubris behind the global infrastructure agenda. Accessible at: https://www.opendemocracy.net/en/oureconomy/rebuilding-world-hubris-behind-global-infrastructure-agenda (access: 30.12.2020).

Solano, L. (2012). *Contextualización histórica de la Franja Transversal del Norte*. Huehuetenango: CEDFOG.

Sturup, S., Low, N. (2019). Sustainable development and mega infrastructure: An overview of the issues. *Journal of Mega Infrastructure & Sustainable Development*, 1(1), 8–26.

Söderlund, J., Sankaran, Sh., Biesenthal, Ch. (2017). The Past and Present of Megaprojects. *Project Management Journal*, 48, 5–16, DOI: 10.1177/875697281704800602.

Talking Infrastructure Initiative (2020). Accessible at: https://talkinginfrastructure.com (access: 30.12.2020).
Tax Policy Center (2020). Briefing Book. Accessible at: https://www.taxpolicycenter.org/sites/default/fi les/briefing-book/tpc_briefing_book_2020.pdf (access: 30.12.2020).
The Conversation (2018). Les grands projets inutiles et imposés, nouveaux champs de l'action politique. Accessible at: https://theconversation.com/les-grands-projets-inutiles-et-imposes-nouveaux-champs-de-laction-politique-96142 (access: 30.12.2020).
The Economist (2017). If you build it... Are big infrastructure projects castles in the air or bridges to nowhere? Accessible at: https://www.economist.com/buttonwoods-notebook/2017/01/16/are-big-infrastructure-projects-castles-in-the-air-or-bridges-to-nowhere (access: 30.12.2020).
The Invisible Committee (2015). *To Our Friends*. South Pasadena: Semiotext(e).
Tsing, A. (2005). *Friction: An Ethnography of Global Connection*. Princeton NJ: Princeton University Press.
UN (2018). Financing for SDGs: Breaking the Bottlenecks of Investment from Policy to Impact. Accessible at: https://www.un.org/pga/72/wp-content/uploads/sites/51/2018/05/Financing-for-SDGs-29-May.pdf (access: 30.12.2020).
UNDP (2017). *Informe Nacional de Desarrollo Humano 2015–2016*. Guatemala: Naciones Unidas.
Wallerstein, Immanuel (2004). *World-Systems Analysis. An Introduction*. Durham: Duke University Press.
Ward, J., Dimitriou, H. (2010). *OMEGA Project 3: Incorporating principles of sustainable development within the design and delivery of major projects: An international study with particular reference to major infrastructure projects*. London: OMEGA Centre, UCL.
Ward, J., Skayannis, P. (2019). Mega transport projects and sustainable development: Lessons from a multi case study evaluation of international practice. *Journal of Mega Infrastructure & Sustainable Development*, 1(1), 27–53.
Weber, B., Staub-Bisang, M., Alfen, H.W. (2016). *Infrastructure as an Asset Class: Investment Strategy, Sustainability, Project Finance and PPP*. Hoboken, NJ: Wiley.
Whalen, Ch., Reichling, F. (2015). *The Fiscal Multiplier and Economic Policy Analysis in the United States*. Washington DC: Congressional Budget Office.
Zwarteveen, M., Ahlers, Rh., Bakker, K. (2017). Large Dam Development: From Trojan Horse to Pandora's Box. In: B. Flyvbjerg (ed.). *The Oxford Handbook of Megaproject Management* (pp. 556–576). Oxford: Oxford University Press.

Abstract

Infrastructure megaprojects observed: "the Grid" and "the Prophecies"

This essay will address the so-called Infrastructure Consensus in terms of the consequences that it brings for Agenda 2030 in its various economic, social, and environmental components. Are massive investments in megaprojects the acclaimed "magic bullet" for our current multidimensional crisis? Or perhaps, by analogy to the concept of "bullshit jobs" formulated by David Graeber, we should speak of "bullshit projects", which rather hijack the political agenda and public money while delaying the transition to a more sustainable world-system?

Keywords: megaprojects, sustainable infrastructure, socio-ecological transition, discourse and power, Anthropocene

Determinants of the intensity of environmental conflicts in Latin America. Statistical perspective

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Introduction

An environmental conflict is any form of mobilization of local communities/social movements against specific investments. The negative impact of these investments on the natural environment is a key element of this mobilization. It can be supported by national and even international organizations. These conflicts usually arise from structural inequalities in income and power and affect the poorest in society. Mobilization as part of the environmental conflict manifests itself through: claims, petitions, workshop meetings, demonstrations, boycotts, strikes, occupations, blockades, international campaigns and many other forms of action (Ramírez Serrato et al., 2016).

Many scientists believe that the concepts of environmental conflict, socio-environmental conflict and ecological conflict are similar in meaning and therefore they can be used interchangeably. The situation is similar with the Ecological Distribution Conflict (EDC), which is defined as social conflict born from the unfair access to natural resources and the unjust burdens of pollution. Environmental benefits and costs are distributed in a way that causes conflicts (Martinez-Alier, O'Connor, 1996). In this text the author has decided to use only the term "environmental conflict".

The Environmental Justice Atlas (EJAtlas) is a dataset on environmental conflicts around the world. By 4 January, 2021, 3,338 such conflicts had been documented. This is a very large number, but it is just a sample of all the cases that "no one knows how many there can be, maybe tens of thousands around the world..." (Martinez-Alier, 2020). New conflicts are added on a regular basis (one a day on average), and those previously introduced are constantly updated. The Atlas is available to everyone. It operates as a dedicated internet platform (https://ejatlas.org/) which was launched in 2014 with 920 cases.

The title of the atlas comes from the name of the social movement in the United States in the 1980s, which was then used to describe the concept formed by the sociologist R. Bullard in 1990. Currently, it is the subject of research in many scientific disciplines, including geography. Environmental

justice presupposes that people have equal access to a high-quality and clean environment, regardless of nationality, religion, race, material status or any other condition (Temper et al., 2015).

L. Temper et al. (2018, p. 576) claim that EJAtlas chronicles "a history of struggle that is actively creating new worlds and new possibilities". It was established as a tool for social activism, research and public education. It serves visualization, encourages dialogue and builds a cooperation network in the field of environmental justice. This is the result of collaboration between activists, journalists and scientists from around the world. Initially – in 2011-2015 – the atlas was financed under the EJOLT project (Environmental Justice Organizations, Liabilities and Trade), and in the following years it developed thanks to: the project EnvJustice (A global movement for environmental justice) and the Acknowl-EJ project (Academic-Activist Co-Produced Knowledge for Environmental Justice) 2016-19. These projects are coordinated by the Institut de Ciència i Tecnologia Ambientals at the Universitat Autònoma de Barcelona.

EJAtlas draws information from the repositories of environmental justice organizations. They include: The Observatory of Mining Conflicts of Latin America (OCMAL), Oilwatch, World Rainforest Movement, FIOCRUZ and the Brazilian network of Environmental Justice (Da Rocha et al., 2018). However, the data for the atlas are collected mainly using a multi-page form. They come from public institutions, activist groups, scientists, company websites, blogs and magazines. Each conflict is selected by the atlas editorial staff. Cases are considered significant according to: 1) environmental activists in a given country and region, 2) media coverage, 3) the size of the investment affected by the conflict, 4) the scale of the investment's impact on society, economy and natural the environment. Each conflict in EJAtlas is displayed as a point on the world map. After clicking on this point, varied information will appear, organized into categories, photographs and data sources.

Without a doubt, EJAltas is a reliable and, so far, the largest database of environmental conflicts. It allows researchers to analyse this phenomenon with the use of statistical methods. The author of this text decided to take advantage of this opportunity.

According to EJAtlas (2021), Latin America is the region of the world which is particularly affected by environmental conflicts. In 1990-2019, 30% of these types of conflicts were recorded in this region. The scale of this phenomenon is more apparent if you take into account the fact that Latin America accounts for no more than 8% of the total land area on Earth. Therefore, it is necessary to take a closer look at the issue of conflicts in this part of the world.

Of course, there are many research questions that can be raised in relation to the subject of environmental conflicts in Latin American countries. This work is limited to only one. The aim was to answer the following question: What differentiates the intensity of environmental conflicts in Latin America?

Methodology

The data from EJAtlas was used to determine the factors differentiating the intensity of environmental conflicts in Latin America. First, the time range of the analysis was determined. The focus was on 1990-2019. These thirty years are a period of increased human pressure on the natural environment in Latin American countries caused by the activities of domestic companies and transnational corporations. The increased human pressure on the natural environment during these years resulted in the outbreak of as many as 793 conflicts, which accounted for nearly 83% of all cases registered in EJAtlas in this region.

An editable conflict list file for statistical analysis cannot be downloaded via the EJAtlas website. So I had to create my own table based on the data displayed on the platform after clicking on each point indicating a given conflict on the map. Due to the labour-intensive nature of data collection process, the number of analysed cases was limited. Ultimately, the following countries were selected: Bolivia, Brazil, Ecuador, Chile, Honduras, Cuba, Mexico, Nicaragua, Uruguay and Venezuela. It is a group of countries, diversified in terms of socio-economic development, in which a total of 422 conflicts were identified (over 53% of the total in the region in 1990-2019). This was found to be an adequate analytical sample.

Each conflict included in EJAtlas has been classified by the developers of this platform into one of five intensity categories. Three of them are hierarchical in nature: a conflict of low intensity (dominated by few and "invisible" forms of mobilization, such as online activism), medium intensity ("visible" forms of opposition prevail, e.g. street protests), and high intensity (massive and violent social mobilization, to which the authorities react with the use of direct coercive measures.) In the latter case, there are casualties and even fatalities. The other two categories – defined for 17 conflicts in the research sample – are difficult to put on an ordinal scale; they have been defined as *latent* or *unknown* (EJAtlas, 2021). Therefore, they were excluded from the analysis. Ultimately, 405 conflicts were statistically tested.

Subsequently, variables that may theoretically determine the intensity of conflicts were selected. Information about the first two variables did not come directly from EJAtlas and was coded on an ordinal scale:

1. Level of social development. Each conflict was assigned a degree of social development of the country where the conflict took place. To determine this level, the arithmetic mean of the Human Development Index (HDI) was calculated for the two border years of the study (1990 and 2019). Then the averaged value was assigned to the appropriate reference bracket/range: <0.75-1> – a high level of development (Chile, Uruguay); <0.65-0.75) – medium; below 0.65 – low (Bolivia, Honduras, Nicaragua).

2. The state of democracy. Each conflict was assigned a category describing the level of democracy of the country in which the conflict took place.

In order to assess this category, the arithmetic mean of the Democracy Index for 2006 and 2019 was calculated. In this case, it was not possible to use the data for 1990, as this index has been calculated by the Economist Intelligence Unit only since 2006. The averaged value of the index was assigned to the appropriate reference bracket/range: <7.5-10> – full democracy (Chile, Uruguay); <6.0-7.5> – defective democracy (Brazil, Mexico); below 6 – hybrid systems and authoritarian regimes (other countries included in the analysis).

Data on other variables that may determine the level of intensity of environmental conflicts were taken directly from the EJAtlas and recorded on the nominal scale:

1. Type of main investment. It was found that the type of investment may influence the type and number of negative consequences, and thus determine the intensity of the conflict itself. For example, some projects increase the incidence of lethal diseases and therefore more social mobilization. Originally, each conflict in EJAtlas was assigned one of ten possible types of investment. For the purposes of this study, four classes (nuclear, tourism recreation, industrial and utilities) were combined into one and named "Other". Ultimately, conflicts were given one of seven possible codes depending on the type of investment (see Table 3).

2. Social groups involved in the dispute. Five groups were selected (Indigenous Peoples, Religious Groups, Women's Movements, International Organizations, Local Authorities). The first is most often presented in the scientific literature as the one that determines the occurrence of various conflicts (not only environmental). Perhaps their involvement also affects the intensity of the conflicts. The remaining four groups were the control ones.

3. Country of origin of the main investors. It was assumed that the origins influence the nature of business practices, and more precisely, the approach to the natural environment and the population living around or in the investment area. Allegedly, company standards are embedded in their countries of origin. If they are lower, conflicts are more likely to escalate. The only information taken from EJAtlas was whether the investing enterprises were: 1) domestic, 2) from other Latin American countries, 3) from western countries (including Japan and South Korea), 4) from other countries (including South Africa and China).

After the data table was elaborated, the chi-squared (χ^2) test of independence was carried out. This test examines the relationship between two variables (X and Y) and more specifically assesses the relationship between the responses distribution in one variable (X) with respect to the other variable (Y). It was checked whether there was a statistically significant correlation between the degree of conflict intensity (dependent variable X with an ordinal scale) and potential determinants of this intensity (explanatory variable Y with an ordinal or nominal scale). The χ^2 test was calculated 12 times because there

were 12 factors which could theoretically influence the intensity of conflicts. The hypotheses for this test were written as follows:

H_0 (null): The variables X and Y are independent.
H_1 (alternative): The variables X and Y are not independent.

The χ^2 test is based on a comparison of the values observed (obtained in the study) and theoretical values (calculated assuming that there is no relationship between the variables). These values are presented in two separate cross tables: one for the observed values and one for the theoretical values. Large differences between the empirical and theoretical distribution indicate the existence of a relationship between the variables. Pearson's chi-squared value (χ^2) determines the magnitude of this "difference". In the traditional way, the value of this test statistic is estimated on the basis of statistical tables. However, in this study, the SPSS statistical program was used. In this case, the χ^2 value was only informative and the decision to reject (or not) the null hypothesis was made on the basis of the p-value calculated by the program. P-value is the probability of making an error when rejecting a true null hypothesis; if it is equal to zero, the probability should be defined as very close to zero. After computing the p-value, it is compared to the assumed significance level α (here $\alpha = 0.05$). If the p-value was lower than the assumed significance level, there were reasons to reject the null hypothesis.

The chi-square test of independence itself assesses whether there is a relationship between the variables, but does not provide information about the strength of this relationship. For this purpose, the contingency coefficient was calculated. There are several types of such a coefficient. In this analysis, the Cramér's V contingency coefficient was chosen, which corresponds to cross tables greater than 2x2, i.e., when they are composed of more than four cells. In this study, the smallest table had six cells (3 rows for the three levels of conflict intensity x 2 columns for the involvement or non-involvement in the conflict of a given group). The Cramér's V coefficient was also calculated using the SPSS program.

Generally, the value of the Cramér's V coefficient is in the range <0;1>. The closer it is to 0, the smaller the strength of the relationship between the examined features, and the closer it is to 1, the greater the strength. This coefficient is considered statistically significant if the p-value determined on the basis of the χ^2 test statistic and the χ^2 distribution is equal to or lower than the significance level α (Cramer, 1946). Depending on the phenomena analysed and the research authors, different numerical ranges are adopted to describe the strength of the correlation. The division adopted in this study is presented in Table 1.

Table 1. Interpretation of the strength of the relationship between variables based on the value of the Cramér's V coefficient

Value ranges of the Cramér's V coefficient	The strength of the relationship between variables
<0–0.2>	very weak
0.20–0.4>	weak
0.40–0.6>	average
0.60–0.8>	strong
0.80–1>	very strong

Results

Table 2 shows the results of analyses concerning the chi-squared test. In six out of twelve cases, the p-value was greater than 0.05, so there was no reason to reject the null hypothesis. In the remaining six, it could be rejected and the alternative hypothesis accepted. In this way, it was proved that the variables analysed were not independent. The intensity of environmental conflicts was found to be dependent on the type of main investment that caused the conflict, the involvement (or not) of indigenous groups, women and international organizations in the conflict, as well as the level of social development and the state of democracy of the country in which the dispute took place. These factors demonstrably differentiated the intensity of the conflicts. These results were not accidental. Following statistical logic, they could be generalized to all environmental conflicts in the Latin American countries studied, including those not included in the EJAtlas.

The results of 12 calculations can be considered important because in each case two conditions for the use of the chi-squared test were met: for 20% at most of the cells in the cross table the expected count was less than 5, and the minimum expected count was greater than 1.

Above, it has been proved that six factors influence the intensity of conflicts. However, the strength of this influence was very weak, as evidenced by the Cramér's V value (Table 2). For as many as five explanatory variables it was lower than 0.2. Only for the type of investment, did this coefficient reach the value of 0.242, so its impact on the intensity of the conflict may be described as weak. At the same time, it is worth noting that the size of the cross table for this factor was much larger than for the other independent variables. This could have resulted in slightly higher values of this coefficient. Therefore, this result should be treated with great reserve.

In Latin America, the average intensity of conflicts decreases with the increase in the level of social development of the country in which they occur (Table 3). Governments of less developed countries and large companies operating in such countries monopolize the use of physical, economic and

Table 2. Chi-squared independence test results

Determinant of intensity		p-value	Cramér's V
Type of the main investment		0.000*	0.242
The level of social development of the country		0.034*	0.113
State of the country's democratization		0.006*	0.133
Groups involved in the conflict	Religious groups	0.235	0.085
	Indigenous groups	0.014*	0.145
	Local government	0.052	0.121
	Women's movements	0.008*	0.154
	International organizations	0.001*	0.191
Country of origin of the main investors	Domestic	0.513	0.057
	From a western country	0.560	0.053
	From another Latin American country	0.701	0.042
	From other countries	0.292	0.078

* below the significance level of 0.05

institutional violence against opposing groups. Unlike in highly developed countries, there is no other force there that would constitute a socio-economic counterbalance to the authorities and corporations. In such conditions, conflicts are much more likely to escalate.

The greatest number of conflicts occurs in countries with a defective democracy (Table 3). There is a logical explanation for this. In such countries it is relatively easy to protest, and it is also difficult to seek justice. Courts are not completely independent and public institutions in general can be corrupt. Therefore, people mobilize themselves by, for example, seeking international help. Moreover, conflicts in defective democracies are more intense than in authoritarian and hybrid regimes (Table 3). It can be interpreted as follows: autocratic authorities do not hesitate to use direct coercion, but the widespread fear of terror prevents people from taking decisive mass actions.

Conflicts in which indigenous people are the protesting group constitute over 68% of the total. They are definitely more violent than when indigenous people are not a party to the dispute (Table 3). This can be explained, for example, by the fact that indigenous groups are often the poorest and the least educated part of society, and therefore do not have the knowledge and means to fight for the enforcement of their rights (e.g., to indigenous land). In dealing with social marginalization and institutional discrimination, they often resort to radical actions that imply highly intense conflicts.

Interesting descriptive statistics concern women's movements (Table 3). They are less often involved in environmental conflicts than other groups covered by the analysis. However, they are much more violent than in the

case of indigenous peoples. This may be because women are inherently less conflictive and/or because they do not have sufficient opportunities to voice their objections in generally highly patriarchal Latin American societies. They join the general mobilization against a given investment when they have no other choice. Their participation may therefore be a manifestation of high intensity of conflicts, and not one of their determinants.

Table 3. Selected descriptive statistics

	Level of social development						
	Low		Medium			High	
Number of conflicts	63		291			51	
Average degree of intensity	2.32		2.21			2.06	
	State of the country's democratization						
	Full democracy		Defective democracy			Hybrid system / Authoritarian regime	
Number of conflicts	51		218			136	
Average degree of intensity	2.06		2.27			2.17	
	Indigenous groups						
	Yes			No			
Number of conflicts	277			128			
Average degree of intensity	2.28			2.06			
	Women's movements						
	Yes			No			
Number of conflicts	99			306			
Average degree of intensity	2.39			2.15			
	International organisations						
	Yes			No			
Number of conflicts	118			287			
Average degree of intensity	2.40			2.13			
	Type of main investment						
	Biomass and Land	Fossil Fuels	Infrastructure and Built Environment	Mineral Ores and Building Materials	Waste Management	Water Management	Other
Number of conflicts	55	58	36	131	29	63	33
Average degree of intensity	2.36	1.84	2.25	2.24	2.31	2.25	2.27

Conclusion

It should be remembered that the chi-squared test of independence – appropriate for nominal and ordinal variables – is one of the group of the weakest tests. The null hypothesis, if false, is more likely not to be rejected by this test than in the case of quantitative variable tests. However, it is the only statistical method that could be used in this analysis.

The studies referred to in this article were only a pilot. Therefore, it is worth extending the scope of statistical analysis, e.g. by taking into account a larger number of variables theoretically explaining the level of conflict intensity. For example, the nature of the negative effects of conflict-generating investments could be taken into account. By implication, the violence of the disputes would be greater if these consequences were already sensed, rather than only feared. Such information is easy to extract from EJAtlas. Furthermore, the interpretation of the results of the analyses that have already been carried out should be made more specific, especially of those relating to the type of the main investment causing a conflict situation. The conclusion part of the study is only at the initial stage of development.

Special thanks to grass-roots activists who continue to be the main source of inspiration, and in particular to all those who have directly or indirectly collaborated and contributed to the EJAtlas.

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Bibliography

Cramer, H. (1946). *Mathematical models of statistics*. Princeton, NJ: Princeton University Press.

Da Rocha, D.F., Porto, M.F., Pacheco, T., Leroy, J.P. (2018). The map of conflicts related to environmental injustice and health in Brazil, *Sustainability Science*, 13, 709–719.

EJAtlas (2021). Global Atlas of Environmental Justice. https://ejatlas.org/ (access: 4.01.2021).

Martinez-Alier, J. (2020). El movimiento global de justicia ambiental y el EJAtlas, https://rebelion.org/el-movimiento-global-de-justicia-ambiental-y-el-ejatlas/ (access: 4.01.2021).

Martinez-Alier, J., O'Connor, M. (1996). Ecological and economic distribution conflicts. In: R. Costanza, J. Martinez-Alier and O. Segura (eds.). *Getting down to Earth: Practical Applications of Ecological Economics*. Washington, DC: Island Press/ISEE.

Ramírez Serrato, N.C., Yépez, F.D., Huerta-Garcia, R.E., Sosa Valdes, R., Castañeda Vázquez, R., Fernández Flores, R.I., Caballero Ramírez, V.H., Monterroso Rivas,

A.I., Romero, M., Ruiz Bedolla, K., Jiménez, I., Conde, C. (2016). Mapeo y análisis de conflictos ambientales en México. Informe final y resumen ejecutivo, Programa de las Naciones Unidas para el Desarrollo, Instituto Nacional de Ecología y Cambio Climático, Ciudad de México. https://www.researchgate.net/publication/320540198_Environmental_conflicts_in_Mexico_Mapeo_y_analisis_de_conflictos_ambientales_en_Mexico (access: 4.01.2021).

Temper, L., Del Bene, D., Martinez-Alier, J. (2015). Mapping the frontiers and front lines of global environmental justice: the EJAtlas, *Journal of Political Ecology*, 22, 255–278.

Temper, L., Demaria, F., Scheidel, A., Del Bene, D., Martinez-Alier, J. (2018). The Global Environmental Justice Atlas (EJAtlas): ecological distribution conflicts as forces for sustainability. *Sustainability Science*, 13, 573–584.

Abstract

Determinants of the intensity of environmental conflicts in Latin America. Statistical perspective

This pilot statistical study analysed several factors that were identified as potential determinants of the intensity of environmental conflicts in selected Latin American countries in 1990-2019. Thanks to the chi-squared test of independence, it was shown that 6 out of 12 variables included in the analysis significantly differentiated the intensity of these conflicts. However, the strength of these relationships – determined on the basis of the Cramér's V coefficient – was usually very weak and only in the case of the type of main conflict-generating investment could it be assessed slightly higher (as weak).

Keywords: environmental conflicts, Latin America, statistical analysis

III. URBAN ISSUE AND SUSTAINABILITY

Megacity Buenos Aires and its most recent conurbation impact

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Introduction

Nowadays, the world has 33 megacities – urban areas which surpass 10,000,000 inhabitants (United Nations, 2018) – and six of them are located in Latin America: São Paulo, Brazil (21,650,000); Mexico City, Mexico (21,580,000); Buenos Aires, Argentina (14,967,000); Rio de Janeiro, Brazil (13,293,000); Bogotá, Colombia (10,574,000); and Lima, Peru (10,391,000).

From a physical point of view, they are the largest constructed urban areas. They are urban agglomerations of thousands of km^2, with physical structures that make an orientation towards global markets possible. Moreover, they are significantly influenced in an international manner: from a political point of view, through deregulation; from a social point of view, through socio-spatial polarisation; and from an ecological point of view, through the highest risk probability (Borsdorf, Coy, 2009).

One of the aspects which have been the centre of attention as regards the spatial evolution of megacities in Latin America is their large fringes. Firstly, the physical extension of the central city is considered; secondly, the conurbation process, which physically merges the city with neighbouring cities; and finally, the improvement in communication which favours its further extension by means of the creation of gated communities, aimed at social groups devoted to economic activities of the CBD (Central Business District) as the top of the interurban centre hierarchy. Finally, some megacities develop *outer cities* within the peripheral urban structure that are semi-autonomous urban spaces, which causes the fragmentation of their outer area into closed polygons that concentrate services and job positions in the tertiary and quaternary sectors of the economy.

Within this context, the aim of this work is to analyse the last great expansion of the Megacity Buenos Aires at the beginning of the 21st century. It underwent a lengthy conurbation process on the farthest fringes when it merged with five cities which were originally separated. Thus, the area of the Megacity Buenos Aires was expanded, and the number of inhabitants grew significantly both in quality and quantity.

This evolution was initially shaped by the leading role that the spatial evolution of the *grey infrastructure* in the area played; the visual empirical evidence was obtained through aerial photography survey for a previous investigation project (Buzai, Lanzelotti, 2019), which was ultimately proven through geo-informatics techniques.

The creation of a raster database in Geographical Information Systems (GIS) made it possible to capture and analyse the logistic growth of the agglomeration between 1869 and 1991, and the digital processing of satellite images of Earth at night allowed for the broadening of the study oriented to the determination of the most recent conurbation process of the megacity. On the maximum expansion axis, the outer border is 90 km from the CBD.

In the following section, the study area is presented, as well as methodological considerations, and cartographic and numerical results of the spatial evolution towards the formation of the current Megacity Buenos Aires. Thus, the spatial distribution and evolution of the agglomeration becomes an empirical spatial manifestation which presents, at a spatial level, contextual aspects corresponding to the incorporation of Argentina into the international economic context.

Study area

The majority of the studies aimed at spatially addressing the main urban area of Argentina are based on the concept of Gran Buenos Aires (GBA) (INDEC, 2003), which includes the Autonomous City of Buenos Aires (CABA) as a central city and 24 municipalities of the Province of Buenos Aires which surround it and constitute a broad conurbation area. Taking into consideration its functional relations with nearby urban areas, but separate from the continuous urban area, the *Dirección Provincial de Ordenamiento Urbano y Territorial* (DPOUyT, 2007) broadens the spatial determination of the INDEC by adding 16 municipalities. Therefore, they consider a greater extension that is formed by the functional entity that comprises 41 spatial units of an urban mosaic.

As the spatial structure, due to being on the coastline of the Río de la Plata, creates semi-circles around CABA as a central city, the concept of *rings* is used. In this sense, the model shows that GBA covers three rings and eight growth areas in urban expansion axes (Buzai, Marcos, 2012). Its most recent

conurbation took place on a fourth ring, although the considerable distance shows that the spatial development occurs mainly in sectors.

Taking into consideration the greater extent of the urban contiguity, Figure 1 shows the study area in full, highlighting the municipalities that correspond to GBA and those that are added and cover the outer area, which as a whole is called *Región Metropolitana de Buenos Aires* (RMBA) as an addition of municipalities that comprise the agglomeration of the Megacity Buenos Aires.

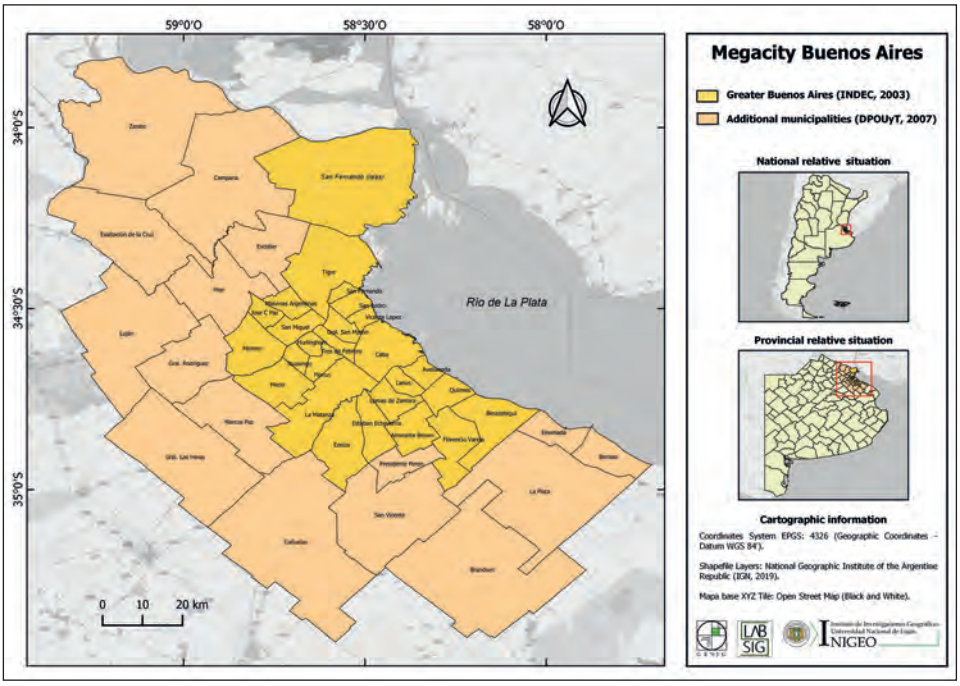


Figure 1. Megacity Buenos Aires. Spatial units (municipalities)

Source: The authors

Methodology

Studying the spatial evolution of GBA involves analysing the concept of agglomeration, i.e., the city as a physical entity which develops on the surface of various contiguous municipalities as a result of its expansion process.

Between 1869 and 1991, eight national population censuses were carried out in Argentina (1869, 1895, 1914, 1947, 1960, 1970, 1980 and 1991), which became a primary source of information along with cartographic contributions from Randle (1969, 1981), Torres (1975), Kollmann (1982), Clarín (1992),

Esso (1992), and Vapñarsky (1998, 2000). A unified database in GIS was created based on these works, which allowed for a cartographic comparison of all the aforementioned years.

The physical analysis of the city leads to the consideration of *adapted space* and *flow system* (Lynch, Rodwing, 1958) as operational concepts of cartographic representation, which are precursors of what nowadays is referred to as *grey infrastructure*.

The creation of thematic raster layers was focused on the flow system when it produced basic territorial units for the construction of adapted space and each 640 metre cell was classified according to the following categories: 1 or 0 depending on whether it belonged or not to the agglomeration each year. Each thematic layer shows the spatial distribution, and the overlay cartographic modelling makes it possible to determine its expansion.

The recent update of the agglomeration, which was complete in 2002 and 2012, was based on the processing of satellite images of Earth at night analysing the brightness based on its grey infrastructure. An extensive documentary and methodological revision as well as the detailed information regarding the sources of the satellite images used can be found in Buzai and Montes Galbán (2020) and Montes Galbán (2020).

On the basis of the said images, the spatial determination of urban coverage for the last period was achieved, considering a brightness threshold which would bring the area closer to the year 1991 as a reference year. The agglomeration was spatially determined in 1992, 2002 and 2012 with the aim of expanding and updating the database, which would allow for the in-depth study of the last two decades.

Spatial distribution and evolution of the megacity

During almost three decades, the spatial growth and configuration of the agglomeration of Buenos Aires has been studied, up to its development into the current megacity as a manifestation of economic, social, and demographic processes (Buzai, 1993, 1994; Buzai, Baxendale, 1998, 2011; Baxendale, Buzai, 2006; Baxendale et al., 2012, 2016) with significant environmental consequences (Baxendale, Buzai, 2006; Buzai, 2007; Morello et al., 2000, 2001).

Counting raster locations in each thematic layer gave rise to the possibility of producing quantitative information corresponding to the area of the agglomeration; the map overlay allowed for the observation of the growth between years; and the national censuses provided the total population by adding municipalities surrounding the central city, which is the Autonomous City of Buenos Aires (CABA) (Table 1).

Figure 2 shows on the left (A) the real time evolution, between 1869 and 2012, by means of a line chart based on the area in km^2 and, on the left (B),

Table 1. Quantitative information

Year	Area (km²)	Population	Period	Increment (km²)	Average annual increase (km²)
1869	33.21	187,126(1)			
1895	86.92	672,983(2)	1869–1895	53.71	2.07
1914	141.49	1,914,450(3)	1895–1914	54.57	2.87
1947	567.44	4,659,768(4)	1914–1947	425.95	12.91
1960	1,282.07	6,758,058(5)	1947–1960	714.63	54.97
1970	1,977.02	8,485,110(6)	1960–1970	694.95	69.49
1980	2,139.79	9,984,104	1970–1980	162.77	16.28
1991	2,317.32	11,271,049	1980–1991	177.53	16.14
2002	3,553.77	12,875,325(7)	1991–2002	1,236.45	112.40
2012	4,078.45	14,756,128(8)	2002–2012	524.68	52.47

Source: The authors

(1) CABA, (2) incorporates Avellaneda, (3) incorporates La Matanza, Lanús, Lomas de Zamora, Moreno, San Fernando, General San Martín, San Isidro, Tigre, Tres de Febrero and Vicente López, (4) incorporates Almirante Brown, Berazategui, Esteban Echeverría, Florencio Varela, Merlo, Morón and Quilmes, (5) incorporates General Sarmiento generating the GBA (initially CABA + 19 municipalities) and General Rodríguez, (6) incorporates Escobar, Marcos Paz and Pilar, (7) incorporates Gran La Plata, Luján, Presidente Perón and San Vicente – census data 2001 – y (8) incorporates Zárate-Campana – census data 2010.

the extent of the growth between the reference years by means of a bar chart which represents the expansion in km². The former allows for the determination of four periods based on the change of the gradient of the line, and the latter shows the extent of the growth between the said years.

Figure 2A shows a logistic growth in three stages between 1869 and 1991 and, a significant increase in its area due to the most recent conurbation between 1991 and 2012. Figure 2B allows for its confirmation based on the magnitude of the last two bars.

The spatial distributions and associations that led to the formation of the Megacity Buenos Aires are presented in Figure 3. In it, a vertical sequence on the left is included, as well as the maps of urban expansion of the agglomeration grouped in three defined periods between 1869 and 1991. This sequence shows a moderate growth in the initial period (1869–1947), an exponential growth in the second period (1947–1970), and a slow balanced growth in the third period (1970–1991). The representations obtained through the use of satellite images of Earth at night are also included for the fourth period (1992–2012). These images represent, in a vertical

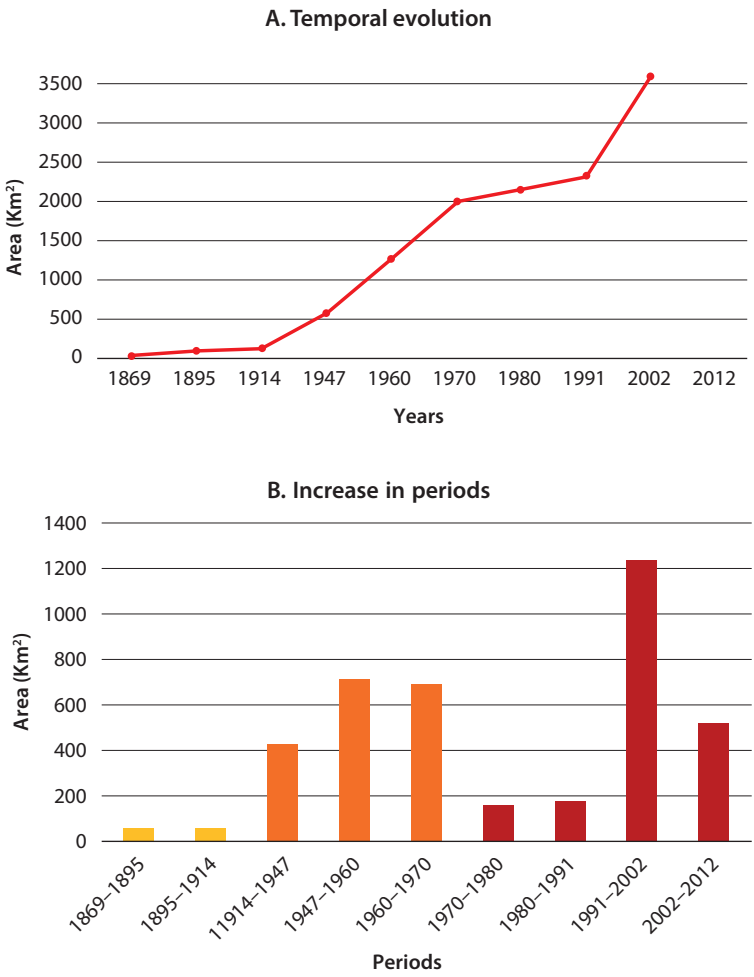


Figure 2. Megacity Buenos Aires. Representation of quantitative evolution (1869–2012)

Source: The authors

manner and on the right of the figure, the most recent conurbation process of the megacity.

The satellite image of Earth at night taken in 2002 shows a conurbation of three axes: 1) Gran La Plata, located in the Southeast as a conurbation area that consists of La Plata, Berisso and Ensenada, and which has 694,253 inhabitants; 2) Luján, located in the West as an intermediate size city which has 67,266 inhabitants, axis mapped in detail by Humacata (2015), and 3) San Vicente-Alejandro Korn, an agglomeration of two cities located in the South which has 56,818 inhabitants. In the image taken in 2012, a fourth axis is added to these conurbation sectors: 4) Zárate-Campana, an agglomeration of two cities located in the Northwest which has 206,058 inhabitants.

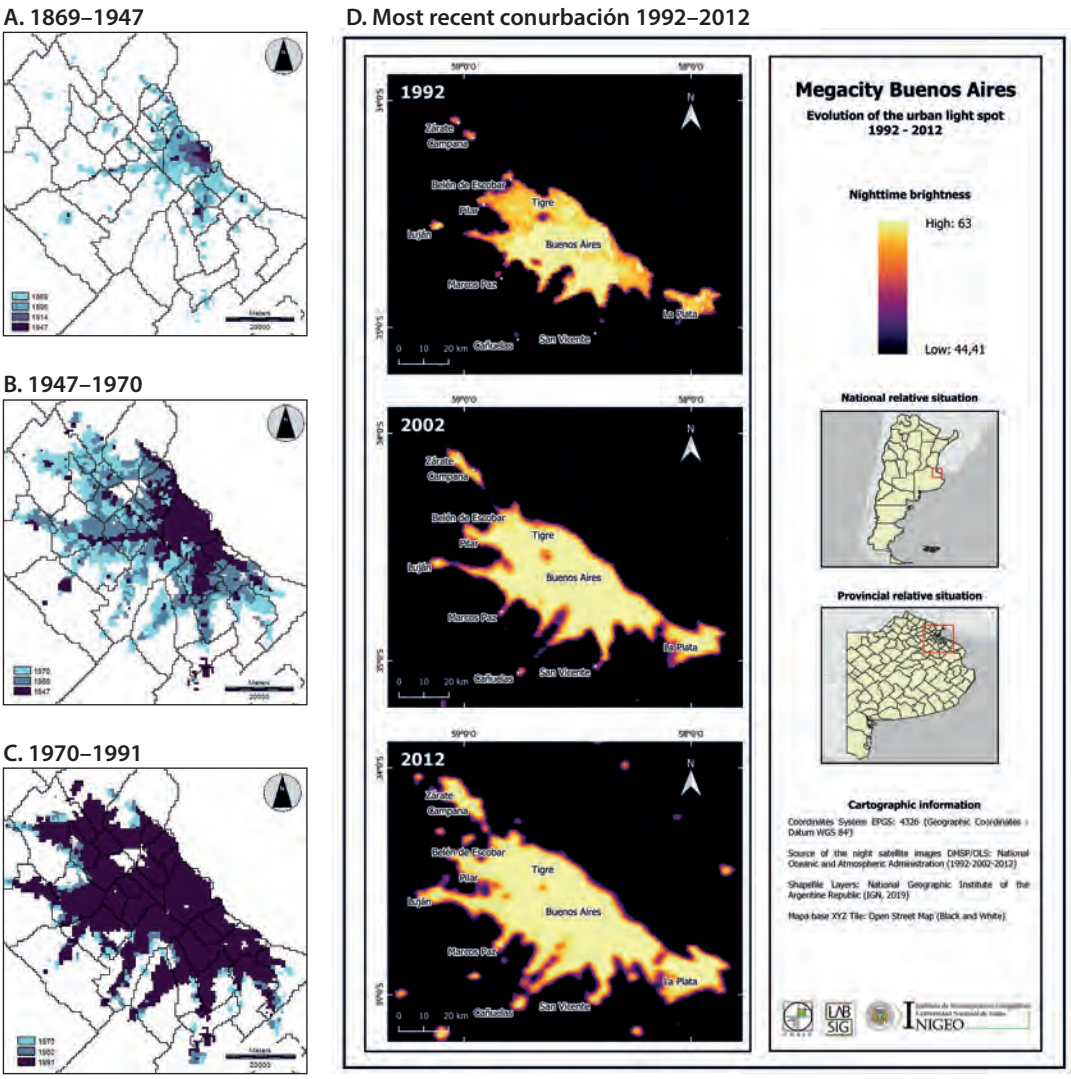


Figure 3. Megacity Buenos Aires. Spatial evolution 1869–2012

Source: The authors

Figure 4 illustrates a summary of the most recent conurbation. Within this figure, the distance of each growth axis in kilometres of each city incorporated to the CBD in CABA is shown. The average distance is 63.75 kilometres, and the maximum distance is 82 kilometres, which is as far as the city of Zárate.

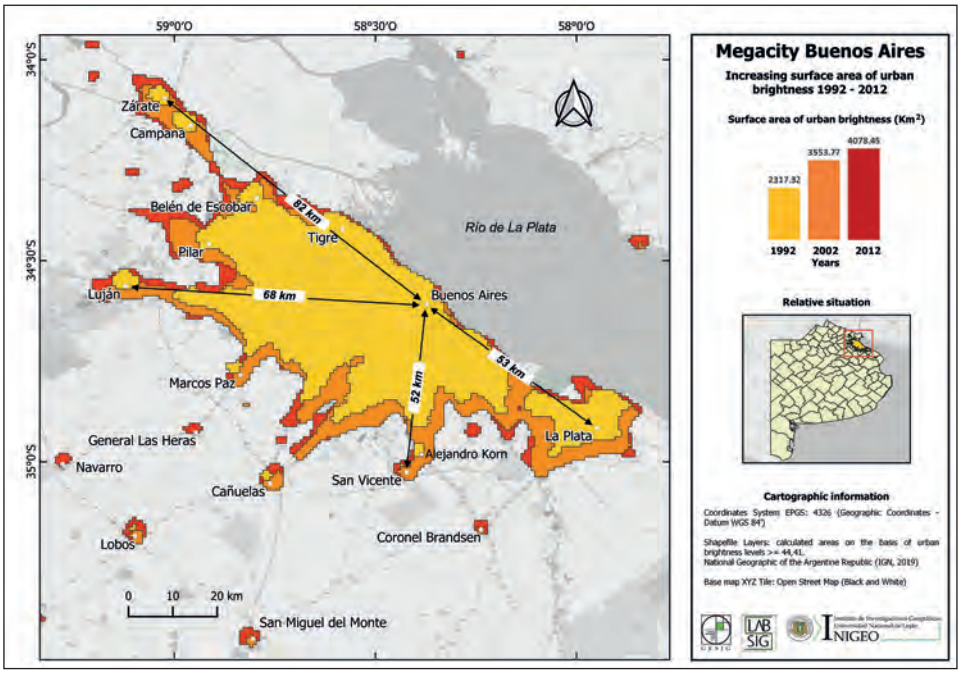


Figure 4. Megacity Buenos Aires. Most recent conurbation

Source: The authors

Interpretation of each period

Spatial Evolution between 1869 and 1991

In the first period, the initial, moderate growth that took place between 1869 and 1947 is the result of a major European migration and of the implementation of the railway and port infrastructure that incorporated the country into the new international division of labour as a primary producer, mainly producing leather, wool and, subsequently, meat and wheat. Highly fertile soils turned the Pampas into a geographical area of great worldwide value (Morello et al., 2001).

Within this period of 78 years, two sub-periods may be highlighted since, between 1869 and 1914, the radial urban growth began to take shape towards the port of Buenos Aires, where the CBD was located, following the main traffic lanes. There, a continuous agglomeration was determined towards the municipalities that bordered the central city, and the first sub-urbanisation process occurred (Torres, 1975) due to the extension of transport and the instalment sale of peripheral lands. Between 1914 and 1947, the spatial configuration of the agglomeration was characterised by the structured blocks that covered a high percentage of the surface of the central city, and the urban expansion reached,

in growth axes, a distance of 40 kilometres. In the aftermath of World War I, the economic crisis of 1930 and World War II, international trade was constantly reduced, and an emerging process of industrialization for consumption goods occurred in industries located in Buenos Aires, which continued to grow.

In the second period, the accelerated growth between 1947 and 1970 is the result of the deepening of the industrialisation process that began in the previous period. In this case, it focused on the manufacture of goods and industrial machinery in the heavy industry (including steel, chemical, petrochemical, and electronic industries). Multinational companies provided a significant international capital (Rofman, Romero, 1997) and, from a spatial perspective, the consolidation of Buenos Aires as a great source of employment was enhanced, thus receiving major migrations from the inland regions and neighbouring countries.

Even though CABA reached a demographic balance with nearly three million inhabitants, which remains stable to this day, municipalities that include the Gran Buenos Aires agglomeration had the largest population growth rate in their history, with 6% between 1945 and 1960 (Lattes, Rechini, 1992). By the end of this period, the municipalities of Vicente López, San Isidro, Tres de Febrero, Morón, Hurlingham, Ituzaingó, Lanús, and Lomas de Zamora became part of the agglomeration. The continuous urban area developed from the axes created by the railways and they extended to, on average, 50 kilometres from CABA.

In the third period, the slowdown in urban growth observed between 1970 and 1991 is related to the last stage of evolution of a logistic growth in which the urban sprawl reaches a growth limit. This took place within the context of a generalised economic depression caused by the competition against national industry that stems from the economic liberalisation (Kosacoff, Aspiazu, 1989).

Internal migrations slowed down along with the growth of the municipalities of Gran Buenos Aires. The growth of cities of intermediate size (50,000 and 1,250,000 inhabitants), which increase their percentage in the population distribution of the country from 24.84% to 33.28% (Sánchez, 1993), can be observed at a national level.

Despite this generalised tendency, during the 1980s, a new process of residential suburbanisation took place, mainly within the upper classes, in the form of peripheral closed polygons which are connected to CABA through highways. These undertakings were generically called gated communities, and created enclaves mainly located in the Northwest growth axis that fragmented the urban structure.

Most recent conurbation between 1992 and 2012

The 1990s is a period characterised by neo-liberal economy in which state-owned public utility companies were privatised. Argentina was definitely incorporated into the globalisation process due to the convertibility plan (1 Argentine *peso* = 1 American dollar) and the labour market flexibility.

Amid this situation, at an urban level, fragmented territorial configurations emerged and were strengthened as a result of the increasing social division. Soja (2000) analysed this as a tendency which is characteristic of the post-Fordist cities oriented to an economy based on financial services. From a spatial perspective, it shows enclosed and guarded spaces as a result of the construction of gated communities (*Carcereal Archipelagos*), the emphasis on socio-spatial differences in local spaces (*Fractal City*), and the emergence of new centralities mainly in highway crossroads (*Edge cities*), which, according to Tella (2001), represent the change from suburbs to post-periphery.

After the 2001 crisis, and a necessary political stabilisation in 2005, it is deemed that an expanding economic activity began with the overcoming of the fiscal deficit after the end of the convertibility plan amidst devaluation and the *pesification* of the economy, which began in 2002. Argentina produced a commercial surplus, and this placed the country as a primary producer again, mainly due to the demand for soy from China and nations of Southeast Asia.

Nationalist measures were introduced, which led to the government regaining control over privatised companies and over subsequent economic, social, and civic advances. In this context of shrinkage and closing of the economy, there were important corporate groups with benefits for large producers, such as the so-called *sowing pools* (Romero, 2019).

At a geographical level, the images show in which manner the interstices were completed between the main axes of the railway and road transport of a radial concentric design at the same time in which the agglomeration merged with outer cities. According to Vidal-Koppman (2014), the tentacle pattern becomes an insular pattern of strong demographic segregation and territorial fragmentation.

The growth of the agglomeration, which strengthens the current Megacity Buenos Aires, matches the models developed for the large cities of Latin America by Jurgen Bärh, Axel Bordorf, Larry Ford, and Günter Mertins during the 1980s and the 1990s, and specifically, with the model of *city of islands* presented by Michael Janoschka in 2002 (Buzai, 2016). During this last period, the foundation for these models can be determined as structures of a new geography of the urban structure processes of the megacities of Latin America (Buzai, 2020).

The Megacity Buenos Aires incorporates four cities of intermediate size to its continuous urban area with the most recent conurbation. Between 1991 and 2002, it incorporated Gran La Plata, Luján, and San Vicente-Alejandro Korn, and between 2002 and 2012, Zárate-Campana. This adds 1,213,905 inhabitants, resulting in a population of nearly 15 million inhabitants, which consolidates the city as the third megacity of Latin America.

Final considerations

This work represents a contribution to the spatial analysis of the Buenos Aires agglomeration since the first national population census in Argentina.

Delimiting the urban sprawl for each year allowed for the definition of four characteristic periods of the urban structures regarding general national, economic, and political context.

The study considers a spatial focus within a complex system formed by different levels of analysis and representation (García, 2006). Within this framework, spatial distributions and their evolution are provided in four periods in relation to wider contexts with specific characteristics.

The confluence of theory, methodology, and techniques of spatial analysis made it possible to obtain a new confirmation as regards the recent spatial evolution of the Megacity Buenos Aires. At the turn of the century, it was determined that its last growth occurred as a result of conurbation, which incorporated into the agglomeration five urban areas that surrounded its fringes, whose distances from the CBD were between 42 km and 82 km.

The satellite images of Earth at night made it possible to get a new perspective of the agglomeration as they clearly show the adapted space and the flow system as *grey infrastructure*. These images allowed for the update of the size of the Megacity Buenos Aires regarding the surface, extension, and population, in addition to the dynamism amid mixed urban growth that arose as a result of the joint evolution of the growth fragmented due to the closed urbanisations in the interstices and the merging of urban areas from the far peripheries.

The Megacity Buenos Aires is an important example of urban development in one of the largest urban areas of Latin America within the social, economic, and political framework of the current globalisation.

Bibliography

Baxendale, C.A., Buzai, G.D., Morina, J.O. (2012). Análisis socioespacial de la calidad de vida en el Gran Buenos Aires (Argentina) a inicios del siglo XXI. In: B. Varela & J. Vinuesa, J. (eds.) *Metrópolis. Dinámicas urbanas*. Buenos Aires: Dunken, pp. 155–182.

Baxendale, C.A., Buzai, G.D., Morina, J.O. (2016). Región Metropolitana de Buenos Aires. In: G. Velázquez (ed.) (2010). *Geografía y calidad de vida en Argentina. Análisis regional y departamental*. Universidad Nacional del Centro de la Provincia de Buenos Aires. Tandil. pp. 261–281.

Borsdorf, A. & Coy, M. (2009). Megacities and Global Change: Case Sudies from Latin America. *Die Erde*, 140(4), 1–20.

Buzai, G.D. (1993). Evolución espacial y distribución poblacional en el Gran Buenos Aires. *Geodemos*, 1, 113–138.

Buzai, G.D. (1994). Buenos Aires 1869–1991: GIS Analysis of its spatial evolution. *International Archives of Photogrametry and Remote Sensing*, 30(4), 64–68.

Buzai, G.D. (2007). Actualización de cálculos y distribuciones espaciales a través de cadenas de Markov y autómatas celulares: Pérdida de suelos productivos en el área metropolitana de buenos Aires, 2001. In: S.D. Matteucci (ed.). *Panorama de la Ecología de Paisajes en Argentina y países latinoamericanos*. Buenos Aires: INTA, pp. 433–450.

Buzai, G.D. (2016). Urban Models in the Study of Latin American Cities. *Innsbrucker Geographische Studien*, 40, 271–288.

Buzai, G.D. (2020). Megaciudades de América Latina. Conceptos, modelos y Geografía de los procesos de estructuración urbana. *Anuario de la División Geografía*, 14, 1–27.

Buzai, G.D. & Baxendale, C.A. (1998). Buenos Aires (1869–1991). La geometría urbana como representación de una historia económica y sociodemográfica. *Signos Universitarios*, 18(34), 71–88.

Buzai, G.D. & Baxendale, C.A. (2011). Dinámica de crecimiento urbano y pérdida de suelos productivos en el Gran Buenos Aires (Argentina), 1869–2011. Análisis espacial basado en Sistemas de Información Geográfica. *Serie Geográfica*, 17, 77–95.

Buzai, G.D. & Marcos, M. (2012). The social map of greater Buenos Aires as empirical evidence of urban models. *Journal of Latin American Geography*, 11(1), 67–78.

Buzai, G.D. & Montes Galbán, E. (2020). Megaciudad Buenos Aires: cartografía de su última expansión y conurbación mediante el procesamiento digital de imágenes satelitales nocturnas. *Revista Cartográfica*, 100, 215–238.

Clarín (1982). *Gran Buenos Aires. Atlas Turístico Clarín*. Buenos Aires.

DPOUyT (2007). Lineamientos Estratégicos para la Región Metropolitana de Buenos Aires. Dirección Provincial de Ordenamiento Urbano y Territorial de la Provincia de Buenos Aires. La Plata.

Esso (1982). Argentina desde el satélite. Buenos Aires.

García, R. (2006). Sistemas complejos. Gedisa. Barcelona.

Humacata, L. 2015. Análisis espacial con Sistemas de Información Geográfica aplicado al eje de crecimiento oeste de la Región Metropolitana de Buenos Aires. In: S. Vidal-Koppmann (comp.) *Metrópolis en mutación*. Café de las ciudades. Buenos Aires, p. 179–208.

INDEC (2003). ¿Qué es el Gran Buenos Aires? Instituto Nacional de Estadística y Censos. Buenos Aires.

Kollmann, M. (1982). Buenos Aires y su Sistema urbano. In: H. Difrieri (ed.). *Atlas de Buenos Aires. Municipalidad de la ciudad de Buenos Aires*. Buenos Aires, pp. 445–467.

Kosacoff, B. & Azpiazu, D. (1989). La industria argentina: desarrollo y cambios estructurales. Centro Editor de América Latina. Buenos Aires.

Lattes, A. & Rechini de Lattes, Z. (1992). Auge y declinación de las migraciones en Buenos Aires. In: J.R. Jorrat, R. Sautu (comp.). *Después de Germani*. Paidós. Buenos Aires, p. 176–196.

Montes Galbán, E. (2020). Expansión y densificación urbana del Gran Buenos Aires (2012-2019) a partir de imágenes satelitales nocturnas. *Revista Geográfica Digital*, 17(33), 2–16.

Morello, J., Buzai, G.D. & Baxendale, C.A. (2000). Urbanization and the consumption of fertile land and other ecological changes: the case of Buenos Aires. *Environment & Urbanization*, 12(2), 119–131.

Morello, J., Matteucci, S.D. & Buzai, G.D. (2001). Urban sprawl and landscape perturbation in high quality farmland ecocystems: The case of Buenos Aires. In: O. Solbrig, R. Paarlberg & F. Di Castri (eds.). *Globalization and the rural environment*. Cambridge: Harvard University Press, pp. 443–447.

Randle, P.H. (1969). Algunos aspectos de la geografía urbana de Buenos Aires. *Anales de la Sociedad Argentina de Estudios Geográficos*, XIII, 213–271.

Randle, P.H. (1981). *Atlas del desarrollo territorial de la Argentina*. Buenos Aires: Oikos.

Rofman, A. & Romero, L.A. (1997). *Sistema socioeconómico y estructura regional en Argentina*. Buenos Aires: Amorrortu.

Sánchez, D.C. (1993). Tendencias actuales del crecimiento urbano mundial y argentino. *Geodemos*, 1, 91–111.

Soja, E. (2000). *Posmetropolis. Critical Studies of Cities and Regions*. London: Blackwell.

Tella, G. (2001). *Del suburbio a la post-periferia: efectos de la modernización tardía en la Región Metropolitana de Buenos Aires*. Buenos Aires: FADU-UBA.

Torres, H. (1975). Evolución de los procesos de estructuración espacial urbana: el caso de la ciudad de Buenos Aires. *Desarrollo Económico*, 15(58), 197–232.
United Nations (2018). The World's Cities in 2018 – Data Booklet. Department of Economic and Social Affairs, Population Division. New York.
Vapñarsky, C.A. (1998). El concepto de localidad: definición, estudios de caso y fundamentos teóricos-metodológicos. Buenos Aires: INDEC.
Vapñarsky, C.A. (2000). *La aglomeración Gran Buenos Aires*. Buenos Aires: Eudeba.
Vidal-Koppmann, S. (2014). Countries y barrios cerrados. Mutaciones socio-territoriales de la Región Metropolitana de Buenos Aires.

Abstract

Megacity Buenos Aires and its most recent conurbation impact

Some three decades of work have allowed us to analyze the spatial trends of the Buenos Aires agglomeration in order to define its shape and distinctive phases of expansion as indicators of the economic and socio-demographic history of Argentina. We consider urban geometry a spatial manifestation of multiple processes; its modelling was carried out from census data, from 1869 to 2001. In this lapse of time it is possible to define distinct periods: Argentina as agro-exporter (1869–1914); initial industrial development of consumer goods (1914–1947); development of base industries based on international capital (1947–1970); de-industrialization processes and financial modifications (1970–1991); deepening of neoliberal policies, convertibility and crisis (1991–2001); and the turn to the nationalist and populist left (2001–2015). The presentation focuses on the latest expansion of the Buenos Aires agglomeration, a conurbation process which integrates intermediate-sized cities of contiguous municipalities. The expansion process developed along five axes that incorporate different cities of the metropolitan region to the urban area at a median distance from the main center (the CBD, Central Business District) of 61 km. The development of the grey infrastructure, as an urban continuum, made it possible to capture its current configuration via the analysis of night-time satellite images. Based on this structure, the megacity Buenos Aires exceeds approximately 15 million inhabitants in an urban area of some 4,000 km^2, consolidating itself as the third largest metropolitan area in Latin America.

Keywords: Buenos Aires, megacity, urban sprawl, conurbation, socio-spatial periodization

Urban conflicts over the space. The case of Manizales, Colombia

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Introduction

While Colombia resembles other states in Hispanic Latin America in experiencing urbanisation processes that take on a range of different dynamics, forms and trajectories, it remains possible to distinguish certain features typical of the cities on the continent colonised by Spain. In particular, from the first half of the 19th century onwards, spatial structure in these urban centres evolved towards ever-greater degrees of dispersion and differentiation in both functional and physiognomic terms. Indeed, also today, it is processes of fragmentation that constitute the main motor behind change in both the spatio-social and functional structure of cities that have taken shape in the whole era from the 17th century through to the present day. Internal migrations – taking place from the mid-20th century onwards and initially motivated politically to a very great extent have underpinned it. However, at the end of the century, Colombia also experienced the forced resettlement of people out of rural areas, to the point where it became a core social phenomenon influencing urbanisation. People having no choice but to leave the countryside behind were then left (even through to the present day) seeking shelter in urban areas as best they might. In doing so, they acted in ways whose main effect has been to greatly enlarge the informal built-up areas present on the peripheries of the cities arrived at. And it is the encroachment of such districts of housing construction into protected areas, and/or those in which the substratum is unstable that is seen to promote further environmental destruction, while also leaving a high level of risk that buildings will eventually be damaged, or even demolished, by landslides, periods of torrential rain, earthquakes, etc.

The processes differentiating cities in functional and spatial terms

Latin America's cities have been experiencing the phenomenon of ever-greater spatial and functional division and societal segregation. Indeed, spatial processes are now seen to be under the influence of a great many factors. Nevertheless, the lead variable here is *perpetuum mobile* – the constant movement… of people, goods, capital and information. Far-reaching fragmentation and disparities in the incomes of city-dwellers only serve to enhance differences in the spatial quality of urban landscapes that may be discerned.

Both spatial relationships and the existing fragmentation occurring are found to be generated by a whole series of variables that include relief (at the time of foundation and during periods of expansion of the built-up areas in peripheral directions), the urban market for land, spatial planning, the structure characterising economic activity, the distribution of population, the profile of inhabitants when it comes to social (and sometimes also ethnic) structure, and traditional forms of construction and material culture.

In connection with the discussion on (and critical analysis of) urban processes in the modern and post-modern eras, Alfonso Vegara and Juan Luis de las Rivas also refer to the phenomenon of urban fragmentation as a further example of the ills facing cities in the era of globalisation. "In the 21st century, new forms of living and arrangement of built-up areas in the city have appeared. We consider them to be the most significant urban phenomenon, which consists of profound transformations taking place in urbanised areas and which lead to a process of dispersion and division of the urban fabric on a regional scale and of a degree of complexity previously unknown" (Vegara, De Las Rivas, 2004, p. 273).

A primary thesis fully able to account for processes of change in the functional, social and spatial structure of Latin American cities has derived from diachronous analysis of city development, which points to a transition from the compact colonial city of precisely-defined socio-spatial structure through to a space presenting an astounding degree of mutation that leads to fragmentation and dispersion, and then in turn to urbanisation chaos. López Rangel (2011) writes that the Latin American cities have moved over from a geometric urban-planning layout (a defined configuration manifesting order) to a disorder denoting nothing less than chaos in the organisation of space. The complex organisation and management of a city, with its host of interlinkages (often incomprehensible from the land-use point of view) and relationships pertaining to urban actors led to the emergence of spatial conflicts and socio-political tensions reflecting, above all, a lack of suitable land for new construction. The conflicts in question have brought about incessant change in ways in which land is both occupied and utilised.

González Plazas maintains that today's city is a conglomerate of mini-clusters, each with specific features; as a result a spatial mosaic is generated (González Plazas, 2009, p. 113). From this it may be concluded that each

mini-core in built-up space, i.e. each estate, neighbourhood or quarter within a district has its own separate physiognomy and morphology – representing a local "centre" with its own attributes and identity radiating out into the immediate surroundings. Such a local centre is to be compared with others adjacent to it, with relations pertaining to those in the vicinity of a potentially competitive, hostile, amiable or neutral nature. Boundaries that may constitute sources of conflict run both spatially and through the awareness of communities living adjacent to one another… and can prove hard to blur, let alone erase; with the result that phenomena manifested in social segregation and physiognomic fragmentation can tend to become entrenched and ineradicable.

In the case of Colombia, the cause of exceptionally marked socio-spatial fragmentation is what might be called "the land question". Access to land, the lack of land for those in lower social strata, speculation in regard to land in cities, the displacement of peasants from the land they utilise and consequent forced flight to the cities, armed attacks mounted on the owners of land – these are all elements inseparable from the political and social history of Colombia for a century or more now. Many and varied political changes that have taken place have failed to curtail these processes, and issues of access to plots of land in cities have been the fundamental shapers of land-use structure. Today they remain an axis along which conflict in society rages. In the view of Gonzalez Plaza, that conflict first emerged as an agrarian problem, but has now been transferred into the urban system, via a complex web of collective and particular interests in need of holistic research so that the action to ease the pressure in society might at last be taken (González Plazas, 2009, p. 122).

Molina López describes the involvement and activity of the inhabitants of estate number VII in the municipality of Barrancabermeja, Department of Santander, in order to show how problems with access to land and services for inhabitants of the lower strata of society might be overcome. When it comes to the quarters inhabited by the poorest strata in society, this municipality has also experienced severe socio-spatial and environmental problems (in fact just like those present in other Colombian cities – *author*). However, bottom-up initiatives and work to develop civil society have been pursued to try and improve living conditions, ensuring that "for more than 10 years now a participatory proposal for territorial order with a regional perspective has been taking shape, providing for curbing of the problems posed – not only to the municipality, but in fact to the entire city – by spatial disparities, social segregation and violence" (Molina López, 2008, p. 259). It has been possible to introduce an integrated urban-development model allowing for a tackling of problems linked to inequality, social exclusion and violence that have traditionally plagued the city in general, and its east side in particular (Molina López, 2008, p. 259).

Urbanisation processes in Manizales

In 2009, González Plazas published a study presenting the spatial development of Colombian cities, and placing particular emphasis on peripheral sprawl, as well as processes via which surrounding villages came to be incorporated into the urbanised areas (González Plazas, 2009). The author in question presents directions to the expansion of the built-up area – from the centre of the historic town in an eastward direction along the ridge, as well as along lines running north and south from the central axis (González Plazas, 2009, p. 108). The author also delimited the suburban (peripheral) areas considered threatened by natural processes and seen to have been settled by the poor. These are present at the northern and southern extremes of the city, as well as in the east – along the road linking the city with Bogota. There was also an attempt to locate the city's poorest districts, which were thought to be present in the north and the south. These zones were at the same time regarded as the ones featuring the most dynamic process of settlement in the new land, in this way best attesting to ongoing fragmentation of the city space. Also emphasised in the study in question is the significance of relief in shaping potential threats arising out of instability of the substratum, the downpours that afflict the region regularly, and seismicity (González Plazas, 2009, p. 108).

Besides change involving fragmentation of the city's central fabric (as very much favoured by the topography in the case of Manizales), its peripheral areas have also been subject to differentiation and division (see the Figure 1). The peripheries (suburbs) are made distinct within the urbanised space thanks to contrasts in the way land and building plots are used, as well as the nature of both rural and urban settlement that is present, and in fact mixed in across the area.

While González Plazas identifies three types of suburban area, the boundaries between the categories are fuzzy, to the extent that differences are in practice attributable to distances from the centre. Thus:

- boundary peripheries (*peryferia de borde*) are at the city limits and are thus suburban areas of discontinuous urban character, in which there are socio-environmental interactions with neighbouring suburbs, with both dispersed areas of settlement still separated by greenspace or farmland and more or less linked via formal roads as "crossing points", and more-consolidated urban-type areas between which large plots still not subject to urban utilisation continue to be present (González Plazas, 2009, p. 99);
- suburban peripheries (*peryferia suburbana*) are actually beyond the city limits, and are thus places in which dynamic urbanisation is ongoing, with plots thus far unoccupied by built-up urban areas being settled and built on, in circumstances of a transformation process whose dynamism and disorder are sufficient to give rise to unfavourable phenomena both environmental and social (González Plazas, 2009, p. 99);

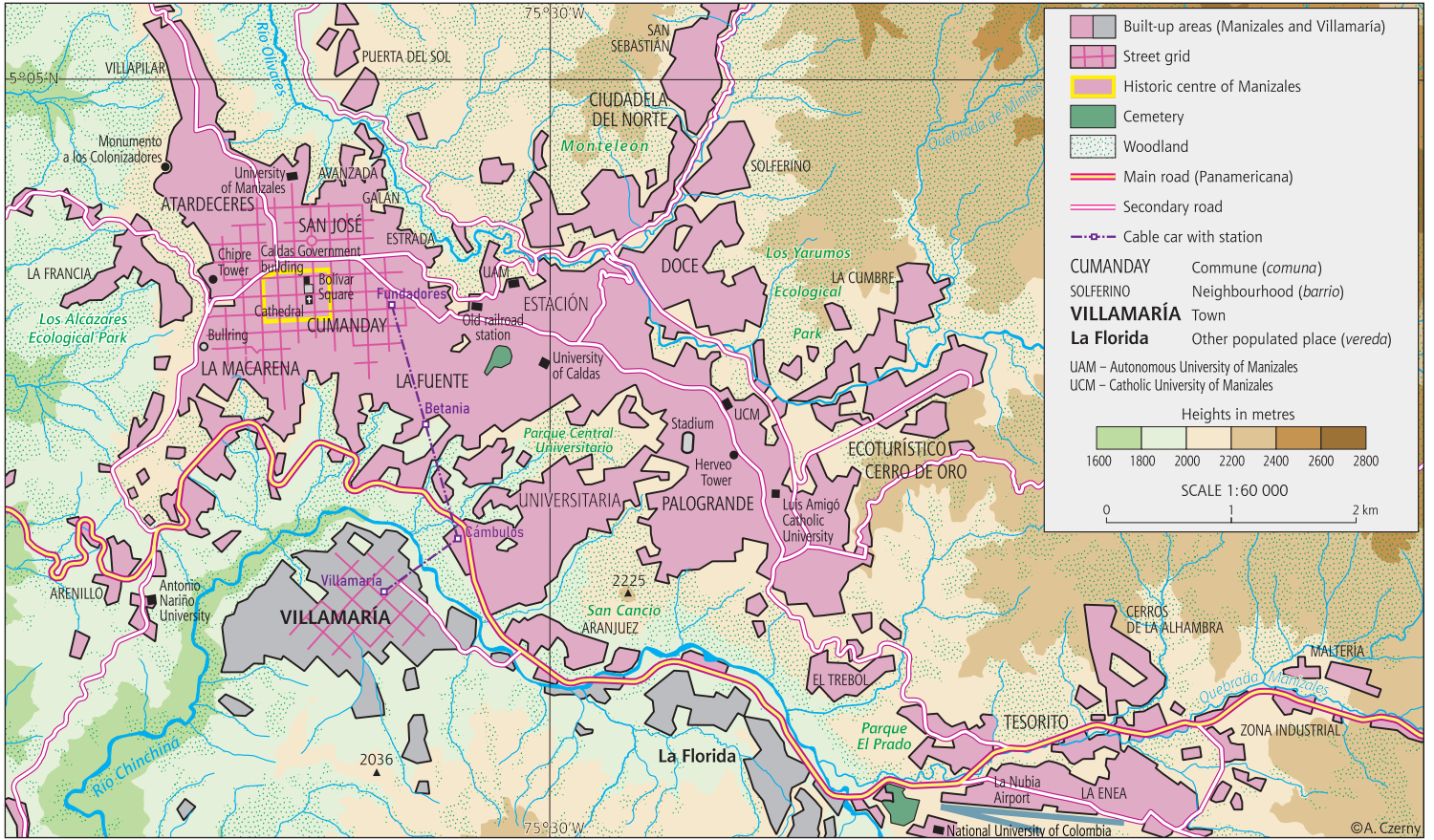


Figure 1. Range of urban development in Manizales. The uneven urban range reflects the complexity of the area. In the northern part of the city there is the Comuna San José, which will be described further on

Author: Andrzej Czerny

– the rural-urban rim (*periferia de franja rural-urbana*) is formed by land now reached by urban influences, but in which agricultural forms of land use remain dominant, even as economic and social relationships grow ever-stronger – first and foremost via the influence of the labour market (González Plazas, 2009, p. 99).

In the case of Manizales, expansion of the built-up urban area can mainly be thought to take place on land of the boundary-periphery type, where urban construction has hitherto been lacking due to aspects of local relief or hydrographic conditioning. Now, developers catering both for society's upper (5th and 6th) strata and poor people (in stratum 1) moving in informally are present in such areas, and are failing to anticipate possible tragic consequences for inhabitants of such physical manifestations as landslides, mudslides, flash flooding, earthquakes and so on.

A good exemplification of this kind of expansion is the occupation by people in social strata 0 and 1 of a deep canyon located in San José district. Here a valley has cut its way through a steep slope and has now been deprived of its natural – stabilising – plant cover as a result of the actions of the new inhabitants. The slope is therefore very much under threat from morphological processes. Paradoxically, this area is actually quite close to the city centre, with a large shopping centre nearby. While the risks attendant upon building new housing here are obviously huge, developers have been pressurising the authorities to move poor inhabitants into this area, and to allow them to proceed with the urbanisation of the slopes (see Figure 2).

With the developer support, the authorities have been pursuing a policy designed to lead to the emergence of a modern built-up area in place of a district steeped in poverty. Unsurprisingly, this has led to severe social conflict as rising house prices force the poor to seek ways of moving once again. An environmental conflict has also arisen as the areas slated for urbanisation are among the most sensitive from the point of view of land stabilisation and water relations. The existing conflict reflects a rational pro-market approach taken by the city authorities, with no heed paid to social aspects. Indeed, the authorities do not recognise the right of the local community to use the land in question, while the developer likewise bought the land denying any right to it on the part of its *de facto* inhabitants.

By its very nature, the macroproject exerts an influence that is segregating, excluding and discriminatory, across dimensions that are social, legal, environmental, financial and urban (Acevedo, 2013). Residents in the municipality of San José (of which there are some 23,000) are characterised by extreme poverty and uncertain living conditions, as well as, of course, the low incomes that go along with that. This is then a situation which transpires the founding and imposition by authorities of an authoritarian urban-segregation policy (Marín Sánchez et al., 2015). It is an activity of a kind that flies in the face of what David Harvey wrote in 2013 – that a city may not be reduced to land viewed in isolation from its inhabitants, social relations,



Figure 2. Comuna San José – at the very top of the mountain, a modern, large shopping centre, surrounded by the areas of the poor people's houses. In the foreground, part of the estate on the slopes

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relationship with nature remaining present within the urban area, style of life and so on. This approach sees the right to a city as meaning more than just the right of individual or group access to resources it preserves or protects. It is rather a right to change and rediscover a city in line with our needs (Harvey, 2013).

Marín Sánchez, Tabares Peralta and González Escobar (2015) thus claim that the inhabitants of the municipality of San José have fallen victim to a macroproject that at no stage even attempted to heed their rights, from the outset riding roughshod over social, cultural, economic and ecological fabric that had somehow taken shape over decades (indeed almost since the city's first years in existence), and going on to ruin, resettle or expel its inhabitants, while ignoring citizens' rights to participate in projects of this type, as well as the legal standards regulating this sphere (Marín Sánchez et al., 2015, p. 13). The irony is that today's district of San José was Manizales's place of first settlement, with consolidation beginning to take place back in the 1970s and 1980s. Equally, the district grew up on private land that owner Luis Guillermo

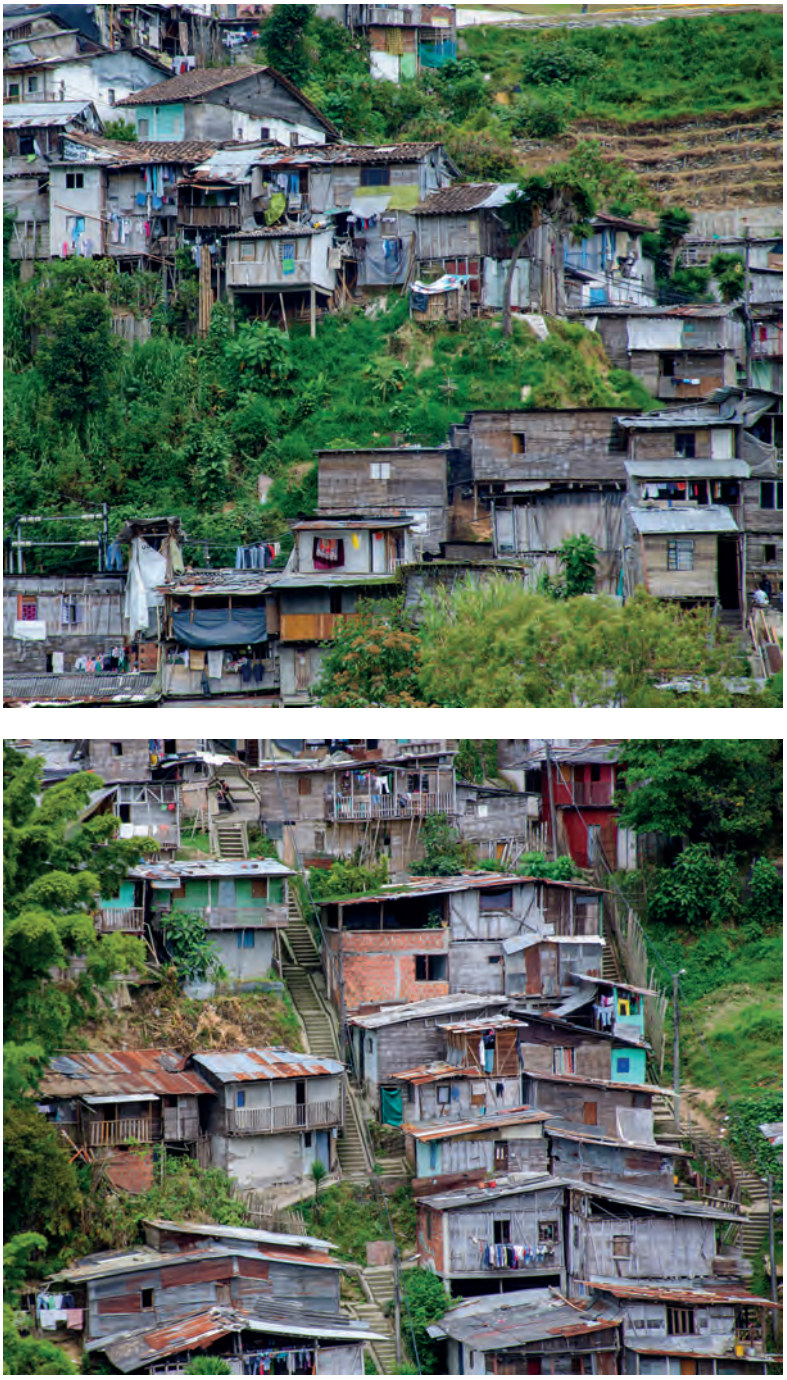
Giraldo divided into plots and actually designated for habitation by the poor strata in society (Arroyo de la Ossa, Daza Daza, 2016).

Later on, the parts of the district on steep slopes were occupied by further waves of poor people who extended into the area already urbanised by the lower strata in society. This is the Sierra Morena area of settlement (the part of Estrada) located on a steep slope and regarded as the one most at risk of all the various natural phenomena reflecting that incline and the major threat posed by landslides. There are 102 ha of occupied land here, surrounded by slopes so hard to manage that they remain covered in natural vegetation – and non-urbanised. It was here in 2016 that extended interviews were run with both inhabitants and the activists trying to help them out (Figures 3 and 4).

Now there is no avoiding the fact that inhabitants of this settlement live first and foremost by their activity in the informal (often straightforwardly illegal) areas of the economy, involving themselves more or less directly in drug dealing and the trade in narcotics, and/or trading in other kinds of illicit ways at markets and bazaars. Many women engage in prostitution. Equally, some cultivate small allotments, growing vegetables and raising livestock, while some work in the building trade. Levels of education among inhabitants are low, with many women not even having full primary education. Fieldwork done on the estate in 2016 within the framework of workshops run for students of the *Doctorado en Desarrollo Sostenible* yielded a great deal of valuable information on living conditions. Thus, to be mentioned as key characteristics of the estate in question are:

- the high proportion of the population made up of elderly people;
- the high density of population – as of 2013, 20 or so impoverished estates across the municipality were home to some 28,000 people (some 5500 families dispersed across the slopes and steep valleys);
- the lack of any social provision whatsoever, or access to social insurance;
- a prevalence of women among inhabitants;
- the informal kind of construction present, despite the steep slopes, and hence the certainty that homes here lack the technical or technological solutions potentially helping to safeguard them against collapse;
- the ephemeral nature of building materials that are in use, like wood and plywood, plastic sheeting, bundles of reeds, corrugated iron and roofing felt;
- the widespread occurrence of phenomena like landslides – which can and do destroy buildings present on the slopes.

As was noted above, this is an area subject to resettlement in line with plans that it should shortly play host to newly-erected apartment blocks. Under the so-called *Macroproyecto San José* it is indeed intended to remove people from the illegal settlements that have arisen in Comuna San José, as well as Galán, La Avanzada, part of San Ignacio, Sierra Morena, Estrada, Camino del Medio, El Tachuelo and Rincon Santo. This denotes the planned demolition



Figures 3 and 4. The housing estate under study is located on steep mountain slopes. It is a settlement particularly vulnerable to damage from landslides and heavy rain

Author: Mirosława Czerny



Figure 5. The photo shows what materials are used to build houses for the residents of this housing estate

Author: Mirosława Czerny

of 2650 homes, with 12,500 people moved on and out (Arroyo de la Ossa, Daza Daza, 2016). Within the framework of the programmes the city has been pursuing, some inhabitants have been moved into new homes. Furthermore, social programmes have been co-financing microfirms that operate in the district… and will be in a position to operate at the new locality so that inhabitants of the settlements will have the opportunity to develop their own formally-recognised economic activity.

NGOs are also at work in the district, offering both advice to inhabitants and playing a role in monitoring the state of the natural environment as well as potential threats arising out of slope erosion and heavy downpours of rain. As was noted above, these threats are serious, and it is the city that is saddled with the costs of reinforcing the slopes. Both the soil cover and local rocks beneath it are porous and very easily penetrated by precipitation – which only increases the risk of rockslides being mobilised. Such phenomena ensure that the networks both bringing in drinking water and taking away sewage have become damaged and have not been subject to renovation for half a century now.

Subsidence of houses, wooden floors on poorly-built premises, and the inundation of dwellings by flows of both water and mud all ensure that the local community is afflicted with many illnesses arising in conditions of poor sanitation. Refuse piles up around homes and is never taken away, while the streams and other watercourses flowing through the area are polluted. Inhabitants must do what they can to guard against plagues of rodents, including rats. Disease is also carried by local mosquitoes and other arthropods (Arroyo de la Ossa, Daza Daza, 2016). The plates here (1, 2 and 3) show clearly the way in which this area has been built up, and the technical state of the buildings present. Ongoing expansion of this built-up area is ensuring a further reduction in the vegetated area, with trees cut and burned so that small areas can be devoted to the growing of essential food plants (like bananas, maize and potatoes; Figure 5).

It is typical for the poor people who live here to live by trading in the informal economy, including dealing in drugs and engaging in prostitution. There is a high crime rate, and signs of vandalism even close to people's homes. In consequence, inhabitants of the wider city inevitably perceive this quarter as a dangerous one (Arroyo de la Ossa, Daza Daza, 2016).

Conclusions

The level of vulnerability of space is increased by problems arising out of the far-reaching fragmentation of the built-up area and expansion of "informal" districts (with inhabitants in strata 0 and 1) into areas not meeting the necessary, suitable technical requirements for the locating of settlements.

First characteristic features of the areas involved are a high density of population as well as the limited size of houses (dwellings) expressed in per-inhabitant terms. This departs from Colombian standards, or those applied more generally in Latin America – where the index attains a higher value than in Europe. The overcrowding of inhabitants from society's lower echelons is mainly a reflection of these people being freshly-arrived migrants from rural areas. And for the first several years of residence in their new city they lack the means to raise the standards of their dwellings either quantitatively or qualitatively.

Large parts of districts or settlements in Colombian cities continue to experience informal processes of urbanisation entailing the erection of buildings that are of low quality, deprived of the essential network infrastructure, and on land posing a major risk of destruction.

As building land in the country's main cities is exhausted, the populace has decided to occupy remaining "free" land, irrespective of its location in absolute terms, or in relation to surrounding areas. The effect is to raise the level of threat to inhabitants posed by the regularly-occurring landslides and flooding of low-lying and marshy areas, as well as by the fact that depressions left by

quarrying are also involved (these often having been filled in the meantime with refuse or even other wastes). Urban built-up areas are also encroaching upon protected areas, be they mountain slopes, forests, wetlands or areas with richer fauna (not least important areas for birds). Given the at-times exceptionally low suitability of some of this occupied land for construction of any kind, processes of soil erosion and water pollution have gathered pace. This is especially true of valley-bottom areas and steep cliffs within them – on which humble abodes of the wooden-hut type are sometimes seen to be "perching" (see Figure 3 and 4). Consequences include soil erosion, the destruction of forests and the pollution of bodies of water on peripheries, as well as a marked overall worsening of environmental quality and quality of life in cities ongoing since the 1990s.

The lack of planning of urbanisation processes and compliance with buildings standards is leading to spatial chaos, while settlements arising through the "invasion" of "free" land or in the context of peripheral "pirate" settlements (with no planning permission) lack any projects or designs providing for the organisation and management of public space.

Bibliography

Acevedo, L.F. (2013). Manifiesto por la reformulación del Macroproyecto San José. Universidad Nacional sede Manizales, Manizales.

Arroyo de la Ossa, M.Y., Daza Daza Alcides, R. (2016). Análisis de sostenibilidad de la Comuna San José: Caso de estudio barrio Sierra Morena. Doctorado de Desarrollo Sostenible, Universidad de Manizales.

Blanco Pérez, M., Peñuela Lizcano, J.D. (2016). Cambios socio-espaciales en los barrios de estratos bajos. Typescript, Universidad de Manizales.

González Plazas, J.L. (2009). Estado actual de la periurbanización y el hábitat periurbano en Mnizales (Colombia). *Cuadernos de vivienda y urbanismo,* 2(3), 92–123.

Harvey, D. (2013). Ciudades rebeldes. Del derecho de la ciudad a la revolución urbana. Akal, Madrid.

López Rangel, R. (2011). De la ciudad compacta a la ciudad fragmentada. El caso de la ciudad de México. En el universo de las nuevas preocupaciones sobre la ciudad: del sueño de un orden a la pesadilla del caos. In: E. Pradilla Cobos (ed.). *Ciudades compactas, dispersas, fragmentadas*. México DF: Universidad Autónoma Metropolitana Xochimilco y Miguel Angel Porrúa Editor. www.rafaellopezrangel.com (access: 27.09.2020).

Marín Sánchez, J.C., Tabares Peralta, D., González Escobar, C.H. (2015). Dinámicas y conflictos socio espaciales generados por la estrategia de desarrollo en Manizales: caso Comuna San José, Universidad de Manizales, Doctorado en Desarrollo Sostenible. Typescript.

Molina López, L. (2008). Comuna 7 de Barrancabermeja: una propuesta participativa de ordenación territorial en barrios de origen informal. ACE, 3 (7), 259–270.

Vegara, A. y De Las Rivas, J. (2004). Territorios Inteligentes. Nuevas visiones del urbanismo. Fundación Metrópoli, Telefónica Movie Star, Proyecto Cities. Laboratorio de ciudades, Cities Art, Madrid.

Abstract

Urban conflicts over the space. The case of Manizales, Colombia

Colombian cities are characterised not only by very dynamic development and growth of built-up areas, but also by progressive socio-spatial segregation. In addition, most cities are located in mountainous areas, where topography is an additional factor in the diversity of development forms. The population is poor, and most often occupies areas with a high level of risk from landslides, torrential rains and mudslides. The poor district of San José, located in the centre of Manizales, occupies precisely such difficult to build up areas. However, due to its central location, the areas it occupies are the subject of land speculation and developers' investment plans. Their strategy leads to evicting the population from the mountain slopes that their poor huts occupy. The local authorities have no idea how to solve this problem.

Keywords: urbanization, socio-spatial segregation, mountainous areas, land speculation, displaced persons

Functions of public space and virtual space – a post-pandemic scenario

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Introduction

During the first wave of the COVID-19 pandemic in spring 2020, half of the world's population has been asked to stay at home or restrict movement in public space for common good. Restrictions on the use of public space, confinement and social distancing have been key preventive measures to reduce transmission of the virus and protect public health. As a result, urban living has changed. There were two overlapping driving forces for this change: the new rules and restrictions, as well as people's fear to physically interact with others. These factors have already resulted in a huge crisis that has effected the use of public space.

COVID-19 has challenged the existing paradigms of the city model: urban sprawl *versus* urban densification, and opened the debate on the functions that are going to be performed mainly in physical public space and the functions that are being systematically transferred to virtual space. The "new normal" is expected to introduce a drastic shift from developing social life in physical space to make human relations outdoors more confined, but more active in virtual space. A higher consumption of the Internet-based activities will become more usual. This will probably entail gaining new functions by the Internet at the expense of physical public space. These expected changes are in line with the decline of the vitality of social life in public space, observed in recent years and widely discussed by academics (Mitchell, 1995; Lofland, 2007). The crisis caused by the pandemic can accelerate and consolidate these changes. On the other hand, such predictions may be clouded by the immediacy of the moment. The pandemic may not lead to a profound transformation, but only modify some practices and the way we use public spaces, yet leave our fundamental approaches and values unchanged. It is also likely that some types of public space will become more vibrant, while others will lose their importance. It is not possible to prejudge which changes of the human behavior in public space will be irreversible and which will be temporary. However, by studying needs and feelings, we can anticipate certain trends in the future. Although the identified symptoms of changes will require further

investigation, going back to the previous order and social behaviors does not seem a possible scenario.

The best opportunity to anticipate which social functions of public space will still be fulfilled in physical space, and which can be successfully redirected to virtual space, is a sudden crisis situation, which forces people to reevaluate their needs, change their current behavior, and reflect on the nature of the publicness of space that they share with others. Looking back at the past, major global events, such as pandemics, economic depressions, and wars have always shaped our societies and the way people experience everyday life. There are many potential impacts of COVID-19 on land use, urban density, telecommuting, energy, transportation, retail, telemedicine, macro-events, arts, leisure and so forth (Honey-Rosés et al., 2020). While global lockdown is destabilizing economy and challenging country leaders, at the human level the pandemic is generating isolation, loneliness, fear, and the inability to participate in social life in the forms that have been used so far. The lockdown during COVID-19 has shown us the power of behavior change and how adaptable humans are (GEHL Architects, 2020).

Two months of lockdown and restrictions associated with COVID-19 in Poland inspired the author to attempt to verify the possible changes of functions of contemporary physical and virtual public space, and to identify which transformations of both types of space are likely to be followed in the future. The purpose of the chapter is to indicate the functions that, according to the respondents' declarations, will lose their significance in physical public space and the functions that will gain importance in virtual space, depending on the type of living environment – from large cities to typical rural villages. As a result, the social function of both physical public space and virtual space will be reconsidered.

Public spaces from the functional perspective

Social sciences treat public space primarily as a certain type of social space, understood as a physical space created and used by people, mediating social relations, and influencing the reproduction of social structures (Lisowski, 2014). In the case of public space, an individual user is not enough, but a group is needed. Therefore, this space cannot be "designed" in the literal sense, because it is the user who decides whether the place meets the requirements of the public space. The space is to be perceived, distinguished and marked as public by those who use it. The main function of public space is fostering interactions that can be assigned to five types (Bierwiaczonek, 2016):

1. the norm of polite inattention, which generally does not lead to direct interaction;
2. one-off interactions (e.g., a request to show the way);
3. interactions (often conversations) as a part of shared situations, such as waiting for a bus;

4. public sociability, i.e. more intense and long-term interactions between people who know each other;
5. direct interactions with pedestrians during street demonstrations, protests, marches, and even interactions between antagonistic groups.

Traditionally understood public space has three functions, namely: 1) meeting, 2) trade, 3) communication/flow/traffic, all based on different types of interaction. Approaching this categorization in more detail, we may distinguish eight categories of public space according to the type of functions it performs (Buksiński, 2011):

1. spaces of self-presentation to others – spaces where we demonstrate our way of life, behavior, clothing, or simply our presence, spaces dominated by non-verbal communication and a youth culture that is seemingly individualistic, but in fact mass and behavioral;
2. spaces of expression – unlike the spaces of self-presentation, these spaces serve to relieve internal tensions and satisfy internal non-material needs, e.g. sports stadiums, gyms, graffiti walls; spaces of authentic, spontaneous expression that reveals the inner self;
3. spaces for viewing – spaces attractive in terms of culture and tourism, due to the works of art, relics of the past or unique landscape;
4. commercial spaces – private spaces from the legal point of view, but public in the social sense, called "publicly used private areas" (Jałowiecki, 2007, p. 81), where not only consumer behavior can be undertaken, but also activities typical of public spaces, such as sitting, observing others, watching the surroundings, walking (Ritzer, 2009); spaces that usually contain simulated and controlled subspaces for entertainment and recreation, attract customers and at the same time become a form of spending free time;
5. assistive/technical spaces – roads, streets, parking lots, means of transportation;
6. spaces for relaxation and entertainment – spaces distinguished by their recreational value;
7. spaces of religious worship and sacred spaces;
8. spaces of power – spaces for dealing with administrative matters: office buildings, public administration buildings.

Bierwiaczonek and Nawrocki (2012) pay attention to two additional categories of public space, particularly important from the social function perspective, namely: third places and local spaces. Third places are not only places separated from the two usual social environments of home ("first place") and the workplace where we go outside ("second place"), but above all, places where we are with other people, interact with them and create a certain community. Local spaces, in turn, regardless of their form (square, promenade), are characterized by a predominance of the "insider" rather than "outsider" category of users. These two categories of spaces are therefore more semi-public than public in comparison to large city parks or spaces for viewing located in

the city center. All the above-mentioned types of public and semi-public space are conducive to acquaintances, establishing new contacts, and participating in social life, therefore they should remain physically available to all interested persons (Lorens, 2010).

Contemporary public space – a shift towards private and virtual space

In contemporary world, also in post-socialist Europe, urban space ceases to be a domain of civic openness, but becomes an area where the culture of the middle class manifests itself. This culture is characterized by increasing mobility, mass consumption and mass recreation (Hajer, Reijndorp, 2001). These phenomena are accompanied by the privatization of space, understood, however, much more broadly than merely changing its ownership status. The privatization of space is also defined as a shift towards achieving individual goals in space. Privatization understood as a concentration on individuals' goals often results in the appropriation of space for the expression of social identity, which leads to its transformation from public good to club good designated for individuals with similar preferences, which are markers of social identity (Heikkila, 1996; Chakravarty, 2008). As a consequence, in contemporary cities, both Western and post-socialist, public space is becoming less associated with space available for everyone and more with spaces of which it is difficult to say whether they are public or not (Kohn, 2004). The privatization of space understood in this way explains the greater need to use homogeneous and exclusive spaces than heterogeneous and egalitarian ones. This need among city dwellers is reinforced with the individualization of spending free time and the existence of repetitive social patterns of spending leisure time mainly at home or in recreational spaces, and to a lesser extent in central cities (Bierwiaczonek, 2016). Sennet (1977) has long argued that individual lives are increasingly private and that, as a result, public culture has declined.

In parallel with the individualization of the use of public space and the growing popularity of club spaces (Kępkowicz et al., 2014), we also observe the process of transferring public life to private and virtual space. It explains why new technologies and new private venues for social exchange are considered a key threat to the public life. These trends may be an extension of what Sennett (1977, p. 5-15) has described as a decline in public life brought on by an increasing emphasis on the private relations of individuals, their families and intimate friends, driven by the rise of secularism and capitalism. Moreover, entertainment, access to information, shopping, financial services, and even voting, can increasingly be undertaken from home using modern technologies (Ellin, 1996, p. 149). As a result, the function of physical public space is more and more limited to recreation, while social and civic life is transferred to other categories of space.

Banerjee (2001) noticed that the perceived decline of public space is based on the assumption that effective public life is linked to a public realm where the affairs of the public are discussed and debated. It is worth noting, however, that these functions traditionally assigned to public space have lost their importance, and nowadays the desire for relaxation, social contact, entertainment, leisure, and simply having a good time seems to be more important from the social life point of view. The question is whether the social function of physical public space is actually diminishing or only the circumstances in which the social contact can happen are changing. The fact that face-to-face communication remains the preferred mode of interaction for business as well as for private activities suggests that public space may not be as threatened by the new technologies as it was once thought (Castells, 1996; Sassen, 1994). The expanded role of third places seems to confirm this (Oldenburg, 1999, 2000; Banerjee, 2001).

Virtual public space

Virtual space, created or functioning thanks to the Internet, is a new social space that allows people to meet each other. Taking into account that the concept of social space is currently used more and more often to metaphorically denote networks of communication, social contacts, information exchange and emotional ties between individuals, the Internet seems to be an appropriate medium for these functions, although it allows solely mediated communication. Virtual space is experienced individually, but it can be included in the ambit of a 'public sphere'. Habermas (1962) saw the public sphere as a domain of our social life in which public opinion can be formed out of rational public debate. Virtual space has become a popular place for public discussion on different issues: political social, religious, and also moral (Jackson, Valentine, 2014). It has triumphed in providing users with a forum for debates and participation as wide as literally the whole world (Abbasi, 2017).

In a contemporary post-modern city, virtual space competes with the physical public space, which is manifested by taking over many functions traditionally fulfilled by the city space. The only question is whether, and if so, how the Internet can fulfill social function. Establishing and maintaining social relations, which are of fundamental importance in the case of social space, seems to be controversial in the context of the Internet communication based on non-spatiality, asynchrony, and anonymity. It is difficult to unequivocally answer the question whether the Internet determines the emergence of new groups, or leads to isolation, cut-off from the real world and resignation from various forms of activity outside cyberspace. Internet users need other people particularly when they want to present themselves, express their own views, opinions and emotions, and relax or entertain in groups of people of similar interests. When performing such functions, virtual space is used collectively

by many people, but usually in the privacy of the users' homes. It leads to the situation when interpersonal contacts become mediated and depersonalized, as their purpose is to establish acquaintances, often irrespective of who the recipient of the sent content is (Szpunar, 2007).

Apart from being in contacts with others, Internet enables also other activities, like virtual recreation defined as using social media, browsing, playing computer games, e-tourism (Winiarski, 2011). On the Internet you can participate in many cultural events and sports events (concerts, performances of music bands, football matches, etc.), play online versions of games, visit museums, watch exhibitions, protest, and even vote. All these functions performed in the physical public space impose face-to-face contact, thus strengthening its social function. In virtual space, social relations as a by-product of virtual recreation, remote work, education, shopping, and civic life, are questionable. Some traditional functions attributed to public space, when transferred to the Internet, become deprived of the social dimension based on direct contact between people. This constitutes the main difference between physical and virtual space.

Social function of public space after COVID-19 – possible changes

Many articles about how the COVID-19 crisis will change our relationship with the public space have been recently written by planners, designers, architects, landscape managers and journalists (Alter, 2020; Florida, 2020; Null, Smith, 2020; Roberts, 2020; van der Berg, 2020). There are also papers that summarize the scientific considerations on the possible effects of a current pandemic (Honey-Rosés et al., 2020). Despite the large number of publications on this topic, it is still unclear if the impacts of COVID-19 on public space will be as profound as they are in other aspects of our life (Corbera et al., 2020). When reviewing many possible scenarios, those that refer to the social function of public space are of special importance.

COVID-19 has made people appreciate local green spaces. In the future, greater demand is expected for small green spaces or neighborhood parks, since they serve as places of refuge from the bustling city. It has been already proved that in cities with "stay at home" orders, green spaces, especially the small neighborhood parks, pocket parks, avenues, and informal green spaces undergo a renaissance and the usage of them has increased (van der Berg, 2020). Moreover, rooftops that are poorly equipped, underused or not used at all, as well as community gardens, began to be credited with much greater potential than usually. In the context of the greater demand for local green spaces, the role of spaces for large public gatherings will remain problematic in the near future. Turning our backs to these spaces will probably debilitate our notion of public space as 'agora' (Honey-Rosés et al., 2020), where we can protest, discuss, and undertake other civic activities. Following these changes, we

may anticipate that suburbs and villages dominated by houses with private gardens should become more desired living environment than densely built cities.

When it comes to functions shifted to virtual space, the increasingly popular remote work and education may turn out to be problematic and bring negative social consequences, especially if we take for granted that human contact is vital for our thinking and being. As virtual workers we do not benefit from informal learning of work-related skills through spontaneous conversation with colleagues (Cooper, Kurland, 2002). The new model of remote work diminishes social contacts between representatives of various social groups and classes. As a result, the pandemic may reinforce social and class differences in the use of public space. Lower income people are more likely to be travelling to work or attending to the public. According to the study conducted in the United States, lower income workers continued to move around in the midst of the pandemic, while higher income workers were more likely to work from home (Valentino-DeVries et al., 2020). Skilled workers can more easily shift to remote working, while types of job performed by lower income population make it impossible. As a consequence, in the near future, some public spaces may cease to be places for social mixing by class, education level or income.

Activities that are most likely to be impacted by COVID-19 are shopping combined with socializing – both representing the modern notion of public space, driven by the consumer culture that emerged in the 19th century. In those times, those who were strolling wide streets and watching window displays, wanted to see other people and be seen by them (Sennett, 2018). The pandemic crisis may decrease pedestrian traffic associated with commercial activity. It may be more difficult to come across spontaneous and informal social interaction in public space in the future.

There are two ideas of future changes in using physical public space. According to one of them youth might grow more accustomed to online isolation. Proponents of the second idea claim that those who have lived through severe confinement or lockdown may have a renewed appreciation of parks and plazas, although this may not be the case for everyone. The pandemic lockdown has already revealed how important public space is for socially vulnerable residents (Anguelovski, 2020), particularly for low-income residents living in cramped flats, children and youth (Honey-Rosés et al., 2020), as well as seniors living alone. It is too early, however, to predict which of these scenarios or anticipated changes, if any, will become a reality. We can only try to identify the symptoms of possible future changes.

The research method

The possible changes in social function of both physical public space and virtual space have been verified by the survey conducted in three Polish metropolitan regions: Warsaw, Gdańsk and Wrocław. The study covered inhabitants

of settlement units belonging to three categories: 1) capital of the region (a metropolis); 2) town located in the area of direct influence of a metropolis (up to 50,000 inhabitants); 3) suburban village devoid of a visible agricultural function; and 4) rural village with a visible agricultural function, located not more than 50 km from the borders of the metropolis, with a significant proportion of homesteads (a house together with outbuildings). Recruitment of respondents occurred via sharing of a survey link on the social media platforms, mainly Facebook. The survey was prepared in Google Forms application and remained available on the Internet from 2 to 22 June 2020. The total number of visited websites was 135, and completed questionnaires 1010.

The population for this study was Internet users. Therefore, it is not surprising that the proportion of people aged 60+ and people with primary or basic vocational education is definitely lower compared to the distribution of these characteristics in the whole society. Women, as usual, turned out to be more willing to take part in the survey. As for the type of built environment, people living in rural villages were the least numerous category (despite the particular commitment to reach them), which imposes caution when generalizing results obtained for this group of respondents. It may suggest that the importance of the Internet and social media in the daily life of villagers is minor. The basic socio-demographic characteristics of the sample are presented in Table 1.

Table 1. Socio-demographic characteristics of the sample

	N	%
Type of settlement unit		
metropolis	346	34.3
town located in the metropolitan region (up to 50,000 inhabitants)	232	23
suburban village	357	35.3
rural village	75	7.4
Gender		
male	275	27.2
female	735	72.8
Education		
primary, lower secondary or basic vocational	59	5.8
secondary or technical secondary	314	31.1
higher	637	63.1
Age		
18 or less	49	4.9
19–25	235	23.3
26–35	241	23.9
36–45	276	27.4
46–60	177	17.5
above 60	31	3.1

Symptoms of permanent changes in the use of public space

The importance of selected functions of public space was estimated by asking respondents how much they missed specific activities that are usually undertaken in public space, but were banned during the strict lockdown period. It turned out that the need for eye contact with others through self-presentation and observing other participants in public life – the functions that once initiated the street life, nowadays has minor contribution to the social role of physical space (Figure 1). This study confirmed the findings of the previous research, according to which contemporary urban public space enables meeting the needs mainly related to relaxation, comfort, and passive involvement, while active involvement and exploring the city become less important (Bierwiaczonek, 2016, p. 155–158). Active involvement cannot be identified only with physical activity, but it also includes civic engagement. The respondents missed walking in the place of residence as well as relaxing in public green areas a bit more than taking up physical activity. All the assessments, however, were only slightly above the neutral score. The answers of villagers (especially those living in rural villages) and people living in cities revealed that representatives of different types of living environment assigned different meanings to the recreational function of public space. During the strict lockdown, the inability to undertake recreational activities in public space turned out to be the most burdensome for the inhabitants of metropolitan cities, and the least for people living in rural areas. The study also confirmed that meeting other people still remains the main social function of public space. This function was the most lacking in all types of settlement units under study (the mean score for the total sample was 3.55). Moreover, the younger the respondent, the stronger the need for meetings in public space (statistically significant correlation[1]).

Respondents were also asked if the importance of particular types of public space is likely to permanently increase, permanently decrease or remain the same for each of them personally after the crisis (Table 2 presents only proportions of those who chose the first answer). Their answers have confirmed the previously-presented results. Following the experiences of the pandemic, respondents are more likely to undertake individual recreational behaviors in public space in the future, both active (cycling, walking) and passive (relaxing and resting without the company of other people). The importance of walking and cycling routes will increase for 48.2% of the respondents and decrease only for 4.6%. In the case of the space of relaxation and passive rest, these percentages were 39% and 9.4%, respectively. Compared to other functions, the significance of public space in the role of a stage that enables to see and to be seen by others will increase only for 14% of the respondents, and decrease for 20.5%. The percentage of people for whom individual recreation will gain

[1] $r = -0.16$; $p < 0.01$

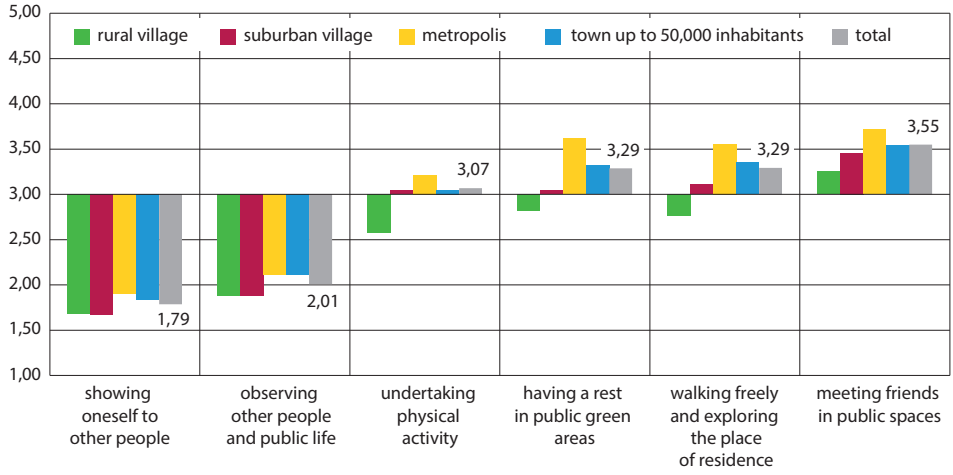


Figure 1. How much did the respondents miss the possibility of... during the lockdown? (*1 – did not miss it at all; 5 – definitely missed it*)

importance is the highest among the metropolitan city dwellers, while those who are in favor of spaces that attract a larger number of people prevail among inhabitants of smaller towns (Table 2). Perhaps this is due to the fact that larger cities are more likely to be inhabited by proponents of individualistic values, who build non-spatial social relationships, and perceive the anonymity of interpersonal contacts as an asset of a large city living environment.

The study has shown that people are rather unwilling to permanently give up or radically limit various forms of recreation or participation in social life, even under the pressure of a crisis situation. The respondents turned out to be the least inclined to permanently limit family gatherings in large groups, as well as the use of local green areas and local recreational areas. The desire to limit visits in shopping centers was assessed as the closest to the neutral score. The analysis of variance did not indicate statistically significant differences in the propensity to limit certain behaviors between residents of different types of settlement units. However, the correlations with age turned out to be statistically significant. The older the respondent, the greater the willingness to reconsider and limit specific recreational behaviors in public space as well as social and family life (Table 3).

Spaces that are supposed to gain in importance the most (walking and biking paths as well as spaces for rest and relaxation) and spaces the visiting of which respondents are the least willing to limit after the pandemic (local green areas) prove how significant the greenery is, especially for city dwellers. The inhabitants of rural villages and those living in a single-family house with a private garden turned out to be the most satisfied with their place of residence, considering the nuisance of the lockdown they experienced. The lowest average rating of the level of satisfaction (although well above the

Table 2. Percentage of respondents who are convinced that a certain type of public space will permanently gain importance for them personally after the pandemic *(% of respondents)*

	rural village	suburban village	metropolis	towns up to 50,000 inhabitants	total
	%				
walking or biking paths*	37.7	45.3	52.4	50.0	48.2
public spaces where you can rest, read a book, relax without the company of other people*	29.0	34.8	45.4	38.5	39.0
public spaces where you can meet your friends	32.9	29.8	39.7	37.1	35.1
public sports and recreational spaces, like outdoor gyms, sports fields	31.8	30.3	33.4	36.1	32.8
open public spaces where official ceremonies, processions, protests or other forms of manifestations take place	22.4	20.5	22.5	28.1	23.1
frequently visited public spaces where you can observe other people or show yourself to them*	9.7	11.9	13.3	19.7	14.1

* statistically significant differences between groups (χ^2 test; $p < 0.05$)

Table 3. How willing are the respondents to permanently limit…? (*1 – very unwilling; 5 – very willing*)

	Mean	N	St. Dev.	Corr. coeff. r (Correlation with age)
visits in shopping centers	2.62	984	1.553	0.192**
participation in mass events, such as concerts, matches	2.31	906	1.480	0.178**
participation in marches, parades and street protests	2.19	659	1.428	0.149**
use of gyms, fitness clubs	2.11	760	1.361	0.163**
use of local clubs, community centers, parish rooms	2.06	659	1.347	0.108**
use of eating places, such as bars, restaurants	2.01	976	1.297	0.256**
use of public transport	2.00	878	1.309	0.097**
use of local recreational spaces, such as a playground, an outdoor gym	1.83	823	1.215	0.098**
use of local green areas equipped with benches	1.56	961	1.017	0.168**
participation in family meetings in a larger group	1.56	989	1.044	0.137**

** $p < 0.001$

neutral rating) was given by residents of metropolitan cities and, at the same time, by those who live in multi-family housing without the access to own or neighborhood garden (Figure 2a, b). Both relationships are moderate and statistically significant[2].

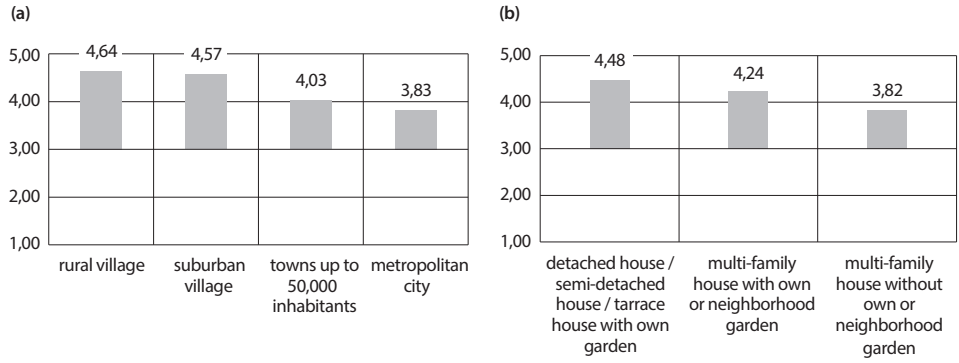


Figure 2. Satisfaction with a place of residence during COVID-19 depending on (a) the type of settlement unit, and (b) the type of housing *(1 – definitely dissatisfied; 5 – definitely satisfied)*

A shift toward virtual space?

During the lockdown period, the role of the Internet as a source of information gained in importance the most, which is in line with its original function. Its role as a platform for contacts not only with people we work or study with, but also with friends and family, has also been strengthened (Table 4). More frequent search for national and international news and more online contacts with friends were primarily the results of the unusual situation that required quick adaptation to the related limitations. Individual entertainment, e.g. watching movies via the Internet, came third after the two above-mentioned functions. Thanks to the pandemic, the Internet has also accelerated the take-over of both shopping and social functions that were originally performed in public space. We have noticed a more frequent use of the Internet as a space for shopping, expressing opinions and meeting other people on forums and on social networks. Changes within these activities, however, were less dynamic.

The majority of the Internet functions were more often used by inhabitants of metropolitan cities, although the differences between particular types of settlement units were in most cases statistically insignificant. The exception was much higher percentage of metropolitan dwellers who more often met

[2] ANOVA (type of settlement unit): F_{Welch} (3; 317.252) = 44.562; $p < 0.01$; $\eta^2 = 0.109$
ANOVA (type of housing): F_{Welch} (2; 197.013) = 47.556; $p < 0.01$; $\eta^2 = 0.092$

online with their colleagues from work or school, watched online theater performances or other cultural events, and ordered meals with home delivery during the pandemic. The delivery market in cities is developing exceptionally fast. Polish consumers are discovering more and more services that are already popular in Western Europe, such as ordering coffee, snacks, food or picking up laundry via a smartphone. The role of the so-called dark stores (or dark kitchens) is also growing. It is a type of store/restaurant of a warehouse character, where goods are stored and meals are prepared, and you may order them only via the Internet. Despite the fact that Internet is the least popular among inhabitants of rural villages, this type of settlement units noticed significantly higher percentages of people who used the Internet for social networking, banking and playing online games more often during the lockdown period than before the crisis.

Table 4. Compared to the pre-pandemic situation, how often did it happen during the lockdown that the respondent… ? *(% of respondents)*

		rural village	suburban village	metropolitan city	towns up to 50,000 inhabitants	total
		%				
searched the Internet for information about the situation in the country	more often or for the first time	65.3	63.3	65.3	63.4	64.2
	with the same frequency	26.7	33.1	29.8	29.3	30.6
	less often or not at all	8.0	3.6	4.9	7.3	5.2
searched the Internet for information about the situation in the world	more often or for the first time	62.7	65.8	62.1	62.9	63.7
	with the same frequency	29.3	30.0	32.9	29.7	30.9
	less often or not at all	8.0	4.2	4.9	7.3	5.4
met online with people for the work or study purposes*	more often or for the first time	48.0	51.0	63.6	59.1	56.9
	with the same frequency	22.7	24.9	20.8	26.7	23.8
	less often or not at all	29.3	24.1	15.6	14.2	19.3
met online with friends or family	more often or for the first time	37.3	49.3	55.5	51.7	51.1
	with the same frequency	42.7	35.6	31.5	30.6	33.6
	less often or not at all	20.0	15.1	13.0	17.7	15.3
watched movies on the Internet	more often or for the first time	45.3	42.0	41.0	45.7	42.8
	with the same frequency	41.3	45.9	47.7	43.1	45.5
	less often or not at all	13.3	12.0	11.3	11.2	11.7

bought clothes and shoes online	more often or for the first time	37.3	41.2	41.3	41.8	41.1
	with the same frequency	38.7	38.4	34.4	37.9	36.9
	less often or not at all	24.0	20.4	24.3	20.3	22.0
used social networks/ forums*	more often or for the first time	53.3	36.4	41.9	38.8	40.1
	with the same frequency	40.0	60.2	54.0	54.7	55.3
	less often or not at all	6.7	3.4	4.0	6.5	4.6
searched local information on the municipality website	more often or for the first time	42.7	41.5	37.3	40.5	39.9
	with the same frequency	32.0	42.0	39.3	35.3	38.8
	less often or not at all	25.3	16.5	23.4	24.1	21.3
someone in the household was buying food products online	more often or for the first time	36.0	35.9	35.5	31.0	34.7
	with the same frequency	30.7	25.8	20.5	31.9	25.7
	less often or not at all	33.3	38.4	43.9	37.1	39.6
ordered ready-made meals with home delivery*	more often or for the first time	21.3	28.3	42.2	35.3	34.2
	with the same frequency	24.0	33.6	30.3	31.0	31.2
	less often or not at all	54.7	38.1	27.5	33.6	34.7
watched theater performances, classical music concerts or exhibitions on the Internet*	more often or for the first time	26.7	30.0	42.8	30.2	34.2
	with the same frequency	29.3	31.9	23.4	34.5	29.4
	less often or not at all	44.0	38.1	33.8	35.3	36.4
participated online in the mass or other religious services (not on television)*	more often or for the first time	26.7	32.8	25.4	27.2	28.5
	with the same frequency	12.0	15.1	12.1	19.4	14.9
	less often or not at all	61.3	52.1	62.4	53.4	56.6
took some Internet course	more often or for the first time	18.7	25.5	25.7	26.7	25.3
	with the same frequency	17.3	22.7	25.1	28.9	24.6
	less often or not at all	64.0	51.8	49.1	44.4	50.1
used banking and financial services*	more often or for the first time	33.3	22.1	24.6	27.2	25.0
	with the same frequency	53.3	71.7	68.5	62.1	67.0
	less often or not at all	13.3	6.2	6.9	10.8	8.0
played online games with friends*	more often or for the first time	34.7	17.9	24.3	22.8	22.5
	with the same frequency	20.0	29.4	27.2	31.9	28.5
	less often or not at all	45.3	52.7	48.6	45.3	49.0

* statistically significant differences between groups (χ^2 test; $p < 0.05$)

According to respondents' declarations, the role of virtual space as a space for working, improving qualifications, and developing personal interests is going to be strengthened after the pandemic, leaving social function within the ambit of the mission of physical public space (Table 5). Working and

indulging own passions via Internet as well as chatting with friends will gain importance mainly in the suburbs. It will probably make living in peri-urban areas more easy, but deepen the problem of social isolation of suburbanites, also the youth. Simultaneously, individual rest or relax in the privacy of one's house is expected to become more popular in rural villages, which may result in reduced needs to take part in cultural life among rural population.

Table 5. Percentage of respondents who are convinced that a certain type of virtual space will permanently gain importance for them personally after the pandemic *(% of respondents)*

	rural village	suburban village	metropolis	towns up to 50,000 inhabitants	total
	%				
virtual space where you can work*	47.6	65.6	65.2	64.1	63.9
virtual space where you can learn and/or improve your qualifications	50.7	63.1	63.2	63.3	62.2
virtual space where you can develop your interests and passions*	43.8	58.0	54.9	57.2	55.7
virtual space where you can chat with friends*	40.5	51.0	48.8	45.7	48.3
virtual space where you can protest or manifest your beliefs*	25.8	34.8	43.6	40.0	38.4
virtual space where you can meet someone new*	23.7	30.5	30.9	31.2	30.3
virtual space where you can rest or relax without the company of other people	30.6	23.2	29.2	27.3	26.8
virtual space where you can observe other people's lives	25.0	24.5	27.1	26.1	25.8

* statistically significant differences between groups (χ^2 test; $p < 0.05$)

Conclusions and discussion

The purpose of the research presented in this chapter was to indicate the functions that – according to respondents' opinions – would lose their significance in physical public space and the functions that would gain importance in virtual space after the pandemic, depending on the type of built environment. The research has shown that social function still remains the essence of public space. Meetings with friends in a physical space accessible to everyone was the most lacking activity as declared by residents of all types of settlement units.

Despite the strong need to maintain this function, it may become more difficult in the future, especially in similar crisis situations, since the social function is fulfilled through social activities that require the presence of other people in space. Social activities occur as a result of necessary and optional behaviors (Gehl, 1987). If these two kinds of activities: necessary (commuting to work/school, using public transport, shopping) and optional (walking, resting in the park, participating in marches or protests) are limited, the possibilities of interacting with other people are also diminished. The scale of changes in the future cannot be precisely predicted right now, but the precedent we are currently dealing with[3] will presumably leave a long-lasting trace in social awareness, consolidate the currently practiced defense mechanisms against such threats in the future, and permanently convince some people to be generally more cautious in spontaneous interactions.

The pandemic has reinforced the necessity to create higher-quality spaces for people rather than for vehicles. Local authorities and planners need to set targets for the distribution of these spaces at different scales that can make neighborhoods more resilient to current and future crises, especially in cities (Wray et al., 2020). The increase in personal mobility observed in recent decades has led in many places to the decline of local, small scale social life, particularly in the suburbs. The pandemic has launched the opposite process. The interest in the local commercial and service offer, as well as local recreational and green areas has already increased. Along with meeting friends in public space, people are the least willing to permanently limit the use of local green and recreational areas (especially city dwellers), which seems to be of special importance for overall human well-being. Parks, forests, trails, pathways, patios, plazas, sidewalks are well-recognized positive contributors to health and well-being (Wilkie et al., 2019). The access to green areas is also a factor increasing satisfaction with the place of residence and strengthening place attachment. During the COVID-19 pandemic, these spaces have become even more important, since for many citizens they are the last outdoor refugee to get exercise and make limited social contact, particularly in densely urbanized areas. It can be assumed that one of the element of the post-pandemic scenario is the growing importance of the quality of local, small-scale public space based on greenery, evenly distributed in city space. Higher density communities, communities composed of more immigrant and/or low-income residents with less access to outdoor space require special attention in this field (Luscombe, McClelland 2020).

The pandemic has opened new possibilities of using Internet, mainly as a space for working, learning and improving qualifications as well as indulging own passions. These activities, however, can, but do not necessarily impose

[3] At the time this text was written, the world was experiencing the second and in some countries even the third wave of the coronavirus pandemic and related restrictions, similar to those implemented during the first wave.

social interactions. Although dynamic development of the above-mentioned functions is more a necessity of a lockdown than a conscious choice, the majority (more than a half) of respondents declared that these functions would permanently gain in importance after the pandemic. Moreover, the pandemic has brought new needs – we want to do more than just connect through messaging and text – we want to see one another. In this sense, virtual space is becoming more social space than before. Remote working, developing own interests and passions via Internet, and chatting with friends will make life easier, but probably more asocial, especially in the suburbs. Simultaneously, the respondents expressed a bit more skepticism as regards the permanent taking over by the Internet those social functions that were traditionally dedicated to physical space like: establishing new contacts, observing people, and manifesting own believes. This was confirmed in November 2020, when in the middle of the second wave of the pandemic, mass protests took place on the streets of Polish cities and towns against the judgment of the Constitutional Tribunal, which changed the existing abortion law in Poland. The several-day long protests of women proved that the Internet cannot replace public space in mass expressing dissatisfaction of certain groups of the society. Residents of rural areas, in turn, occurred to be the least bonded to public space and its social function. Additionally, the growing importance of the Internet may weaken the mutual social dependencies and flows between the city and the countryside.

The pandemic raised the question of the legitimacy of further promotion of the idea of a compact city. People living close to nature or having their own garden turned out to be a bit more satisfied with their place of residence during the lockdown. If we assume that people have different housing preferences and make trade-offs on the pros and cons of different places when deciding where to live, the average level of life satisfaction should be similar at different places, provided that personal socioeconomic characteristics are controlled (Morrison, 2007). Most people report a positive level of life satisfaction (Biswas-Diener et al., 2005) and are quite satisfied with various types of residence (Jansen, 2013, 2014). Differences in neighborhood satisfaction identified in the research may express the positive impact of better access to green spaces and recreational areas in the suburbs and in rural villages. These types of public space turned out to have the greatest potential for the future. The real estate market analysis shows that Poles have recently become more willing to look for houses with a garden or recreational allotments, which may undermine the efforts to reduce mass suburbanization.

A crisis situation usually opens up new research fields. When examining unexpected changes taking place in a well-recognized reality, one should be very careful not to look too far into the future when describing the effects of these changes. Rapid changes in behavior may be short-term, and people are generally reluctant to give up their habits and established patterns of behavior.

Bibliography

Abbasi, S. (2017). Internet as a Public Space for Freedom of Expression: Myth or Reality? *SSRN Electronic Journal*, https://ssrn.com/abstract=3064175 or http://dx.doi.org/10.2139/ssrn.3064175 (access: 10.11.2020).

Alter, L. (2020). Urban design after the coronavirus. *Treehugger*, https://www.treehugger.com/urban-design/urban-design-after-coronavirus.html (access: 10.11.2020).

Anguelovski, I. (2020). Expanding the boundaries of justice in urban greening scholarship: Towards an emancipatory, antisubordination, intersectional, and relational approach. *Annals of the American Association of Geographers*, 110(6), 1743–1769. DOI: 10.1080/24694452.2020.1740579.

Banerjee, T. (2001). The future of public space: Beyond invented streets and reinvented places. *Journal of the American Planning Association*, 67(1), 9–24.

Bierwiaczonek, K. (2016). Społeczne znaczenia miejskich przestrzeni publicznych. Katowice: Wydawnictwo Uniwersytetu Śląskiego.

Bierwiaczonek, K., Nawrocki, T. (2012). Teoretyczne spojrzenie na przestrzeń publiczną. In: K. Bierwiaczonek, B. Lewicka, T. Nawrocki, *Rynki, malle, cmentarze. Przestrzeń publiczna miast śląskich w ujęciu socjologicznym* (23–64), Kraków: NOMOS.

Biswas-Diener, R., Vittersø, J., Diener, E. (2005). Most people are pretty happy, but there is cultural variation: the Inughuit, the Amish, and the Maasai. *Journal of Happiness Studies*, 6, 205-226. DOI: 10.1007/s10902-005-5683-8.

Buksiński, T. (2011). Publiczne sfery i religie. *Pisma Filozoficzne*, CXVII. Poznań: Uniwersytet im. Adama Mickiewicza w Poznaniu, Wydawnictwo Naukowe Instytutu Filozofii.

Castells, M. (1996). *The Rise of the Network Society*. Oxford: Blackwell.

Chakravarty, S. (2008). Is public space a public good? A structure/agency view of the 'narrative of loss'. Working Paper from USC Lusk Center for Real Estate 8527, http://econpapers.repec.org/paper/lukwpaper/8527.htm (access: 10.11.2020).

Cooper, C.D. and Kurland, N.B. (2002). Telecommuting, professional isolation, and employee development in public and private organizations. *Journal of Organizational Behavior*, 23(4), 511-532. DOI: 10.1002/job.145.

Corbera, E., Anguelovski, I., Honey-Rosés, J., Ruiz-Mallén, I. (2020). Academia in the Time of COVID-19: Developing an Ethics of Care. *Planning Theory & Practice,* 21(6485), 1–9. DOI: 10.1080/14649357.2020.1757891.

Ellin, N. (1996). *Postmodern Urbanism*. Oxford: Blackwell.

Florida, R. (2020). We'll Need To Reopen Our Cities. But Not Without Making Changes First. *CityLab*, March 27, 2020, https://www.bloomberg.com/news/articles/2020-03-27/how-to-adapt-cities-to-reopen-amid-coronavirus (access: 10.11.2020).

Gehl, J. (1987). *Life between Buildings: Using Public Space*. New York: Van Nostrand Reinhold.

GEHL Architects (2020). Public space & public life during COVID, https://covid19.gehlpeople.com/ (access: 10.11.2020).

Habermas, J. (1962). The Structural Transformation of the Public Sphere: An Inquiry into a Category of a Bourgeois Society. Cambridge, MA: MIT Press.

Hajer, M., Reijndrop, A. (2001). *In Search of New Public Domain*. Rotterdam: NAI Publishers.

Heikkila, E.J. (1996). Are municipalities Tieboutian clubs? *Regional Science and Urban Economics*, 26(2), 203–226.

Honey-Rosés, J., Anguelovski, I., Chireh, V.K., Daher, C., Konijnendijk van den Bosch, C., Litt, J.S., Mawani, V., McCall, M.K., Orellana, A., Oscilowicz, E., Sánchez, U., Senbel, M., Tan, X., Villagomez, E., Zapata, O., Nieuwenhuijsen, M.J. (2020). The impact of COVID-19 on public space: an early review of the emerging questions – design, perceptions and inequities. *Cities & Health*, DOI: 10.1080/23748834.2020.1780074.

Jackson, L., Valentine, G. (2014). Emotion and politics in a mediated public sphere: Questioning democracy, responsibility and ethics in a computer mediated world. *Geoforum*, 52, 193-202. DOI: 10.1016/j.geoforum.2014.01.008.

Jansen, S.T. (2013). Why is housing always satisfactory? A study into the impact of preference and experience on housing appreciation. *Social Indicators Research*, 113, 785–805. DOI: 10.1007/s11205-012-0114-9.

Jansen, S.T. (2014). Why is housing always satisfactory? A study into the impact of cognitive restructuring and future perspectives on housing appreciation. *Social Indicators Research,* 116, 353-371. DOI: 10.1007/s11205-013-0303-1.

Jałowiecki, B. (2007). *Globalny świat metropolii*. Warszawa: Wydawnictwo Naukowe Scholar.

Kępkowicz, A., Mantey, D., Lipińska, H., Wańkowicz, W. (2014). Club landscape as a manifestation of substitutive public spaces in suburbs. *Architektura Krajobrazu*, 3, 56–71.

Kohn, M. (2004). *Brave New Neighborhoods: The Privatization of Public Space*. London: Routledge.

Lisowski, A. (2014). Typy przestrzeni a geografia. *Prace Komisji Krajobrazu Kulturowego*, 24, 7–18.

Lofland, L.H. (2007). *The Public Realm. Exploring the City's Quintessential Social Territory*. London: Aldine Trensaction.

Lorens, P. (2010). Definiowanie współczesnej przestrzeni publicznej. In: P. Lorens, J. Martyniuk-Pęczek (eds.), *Problemy kształtowania przestrzeni publicznych* (pp. 6–20), Gdańsk: Wydawnictwo Urbanista.

Luscombe, A., McClelland, A. (2020). Policing the pandemic enforcement report, April 14 2020–May 1 2020. Policing the Pandemic Mapping Project, www.policingthepandemic.ca (access: 10.11.2020).

Mitchell, D. (1995). The end of public space? People's park, definitions of the public and democracy. *Annals of the Association of American Geographers*, 85(1), 108–133.

Morrison, P.S. (2007). Subjective wellbeing and the city. *Social Policy Journal of New Zealand*, 31, 74–103.

Null, S., Smith, H. (2020). COVID-19 Could Affect Cities for Years. Here Are 4 Ways They're Coping Now. *World Resource Institute*, March 20, 2020, https://www.wri.org/blog/2020/03/covid-19-could-affect-cities-years-here-are-4-ways-theyre-coping-now (access: 10.11.2020).

Oldenburg, R. (1999). *The Great Good Place: Cafes, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of a Community*. Florida: Malowe & Company.

Oldenburg, R. (2000). *Celebrating the Third Place: Inspiring Stories about the "Great Good Places" at the Heart of Our Communities*. New York: Marlowe & Company.

Ritzer, G. (2009). *Magiczny świat konsumpcji*. Warszawa: Warszawskie Wydawnictwo Literackie Muza SA.

Roberts, D. (2020). How to make a city livable during lockdown. *Vox*, April 22, 2020, https://www.vox.com/cities-and-urbanism/2020/4/13/21218759/coronavirus-cities-lockdown-covid-19-brent-toderian (access: 10.11.2020).

Sassen, S. (1994). *Cities in a world economy*. Thousand Oaks: Pine Forge/Sage.

Sennett, R. (1977). *The Fall of Public Man*. London: Faber & Faber.

Sennett, R. (2018). *Building and Dwelling: Ethics for the City*. London, UK: Penguin Random House.

Szpunar, M. (2007). Alienacja i samotność w sieci vs grupowość i kapitał społeczny w Internecie. Internet i jego wpływ na kontakty społeczne. In: M. Sokołowski (ed.), *Oblicza Internetu* (pp. 96–97), Elbląg: Wydawnictwo Tekst.

Valentino-DeVries, J., Lu, D., Dance, G.J.X. (2020). Location Data Says It All: Staying at Home During Coronavirus Is a Luxury. *The New York Times*, April 3, 2020,

https://www.news18.com/news/world/location-data-says-it-all-staying-at-home-during-coronavirus-is-a-luxury-2563915.html (access: 10.11.2020).
van der Berg, R. (2020). How Will COVID-19 Affect Urban Planning? *TheCityFix*, April 10, 2020, https://thecityfix.com/blog/will-covid-19-affect-urban-planning-rogier-van-den-berg/ (access: 10.11.2020).
Wilkie, S., Townshend, T., Thompson, E., Ling, J. (2019). Restructuring the built environment to change adult health behaviors: A scoping review integrated with behaviour change frameworks. *Cities & Health*, 2(2), 198-211. DOI: 10.1080/23748834.2019.1574954.
Winiarski, R. (2011). Wprowadzenie do zagadnień rekreacji i czasu wolnego. In: R. Winiarski (ed.), *Rekreacja i czas wolny* (13–28), Warszawa: Łośgraf Publishing.
Wray, A., Fleming, J., Gilliland, J. (2020). The public realm during public health emergencies: exploring local level responses to the COVID-19 pandemic. *Cities & Health*, DOI: 10.1080/23748834.2020.1790260.

Abstract

Functions of public space and virtual space – post-pandemic scenario

The best opportunity to anticipate which social functions of public space will still be fulfilled in physical space, and which can be successfully redirected to virtual space, is a sudden crisis situation, which forces people to reevaluate their needs, change their current behavior, and reflect on the nature of the publicness of space that they share with others. Two months of restrictions associated with COVID-19 in Poland inspired the author to attempt to verify the functions of contemporary physical and virtual public space, and to identify the directions of changes that both types of space are likely to follow in the future. The purpose of the chapter is to indicate the functions that – according to the respondents' declarations – will permanently lose their significance in physical public space and the functions that will permanently gain importance in virtual public space. The above-mentioned functions and their changes have been analyzed in big cities, small towns, suburbs and rural villages in metropolitan areas of three Polish cities: Warsaw, Gdańsk and Wrocław. The research has shown that social function still remains the essence of public space. During lockdown, meeting friends in a physical space accessible to everyone was the most lacking activity as declared by residents of all types of settlement units. Along with meeting friends in public space, people were the least willing to permanently limit the use of local green and recreational areas (especially city dwellers). The pandemic has opened new possibilities of using the Internet, mainly as a space for working, learning and improving qualifications as well as indulging own passions. These activities, however, can, but do not necessarily impose social interactions.

Key words: pandemic, physical public space, virtual space, Internet, social function of space

Revitalisation and adaptation of cities in Poland. Inconsistent processes[1]

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Challenges faced by contemporary cities

Cities are undergoing constant transformations as a result of many factors, such as the development of science and technology. The effect of technological transformation in the industry (e.g. the invention of the steam engine) on the shaping of urban areas was very much visible in the second half of the 19th century. In turn, the development of industry and transport had an impact on the migration of large groups of people from rural areas to cities. This phenomenon contributed to their expansion and further dynamic growth. Other changes – technological, economic as well as political – in the 1970s or 1980s (a period sometimes referred to as the urban crisis, which happened partially due to the great fuel crisis of 1973) contributed to an important spatial reorganisation of cities. On the other hand, the events of the 1990s were significant for the transformations and condition of the agglomerations located in the so-called Eastern Europe (Jaroszewska, Wieczorek, 2016). The industry existing there started to be liquidated, which led to certain effects, such as reduction in the number of jobs and, in turn, increase in the number of the unemployed [Łódź, where the liquidation of the textile industry contributed to social problems of the city and strong degradation of the urban tissue (Górecki, Józefiak, 2020), or large industrial cities of North America could be good examples]. These phenomena led to the formation of areas of poverty and social exclusion, which resulted in the degradation of the urban tissue – one of its consequences was, for instance, less income tax property tax revenue from the inhabitants of given areas. This in turn contributed to the decrease in funds for maintenance of the current infrastructure and investment in the new one (Błaszczyk, 2015). This applied both to the degradation of post-industrial

[1] The article has been compiled using research with financial support from the NCBiR grant, no. EraNet – Lac/3/Citadine/2/2019 of 18.03.2019 r.

areas, often with valuable architectural structures, as well as workers' housing estates located in close proximity of closed work establishments.

In Poland we can also observe degradation of central urban areas, which were already neglected after 1945 (as a result of the development of modernist districts in cities – often on their outskirts – and exchange of a high number of privately-owned flats for council flats in pre-war tenements). In later years, migration of more affluent inhabitants of these flats to new estates or outside the city was observed – old flats, often ruined or without central heating or plumbing – were occupied by families on lower incomes or seniors. This negligence, occurring for many years, contributed to the fact that in the 1990s, the central urban areas were already in critical condition (Domański, Gwosdz, 2010).

The reconstruction, repair or revitalisation of these areas became a challenge for many local governments, which forced them to start revitalisation schemes understood as complex and long-term activities prepared for the degraded parts of cities, leading to their renovation in social, economic (Chądzyńska, 2015) or spatial terms.

However, today's cities face other challenges related to the aftermath of climate changes, which lead to direct threat to health and life of their inhabitants as well as to the destruction of the urban infrastructure. This, in turn, results, for instance, in phenomena connected with glacier melting, which leads to rising sea and ocean levels and to an increase in the frequency and force of climate episodes often resulting in natural disasters (Bigio, 2003). It is calculated that three out of five cities with five hundred thousand inhabitants are exposed to some type of natural disaster. In the last 20 years, 1.3 million people died and 4.4 million were harmed as a result (www.un.org). It was also the cause for many millions of people to leave their homes (Gu, 2019).

A way to alleviate the effects of these consequences will be proper adaptation to variable climate conditions of rural areas. Changes in urban spaces should be systemic and make use of tools in spatial management as well as the potential of the local governments and communities (Gu, 2019).

Activities related to the revitalisation and adaptation of cities to climate change are similar in their complexity, they pertain to urban areas and they affect the community inhabiting it. Both activities as tools of repair – adaptation of cities – can use the so-called green infrastructure as well as nature-based solutions (NBS) being part of that infrastructure.

Methods

The aim of this article is to show that the revitalisation and adaptation to climate change are similar and often pertain to the same areas of transformation in cities. As a result, they should be planned and implemented in tandem. This would allow facilitation of changes in urban spaces by using the joint

tool, that is the green infrastructure, and by organising joint activities with the local communities – which would allow their activation as well as achievement of additional income. Inadequate activities or activities that have not been thought through can lead to considerable social problems by initiating processes involving gentrification.

Despite obvious similarities between these activities and the benefits to be derived from their simultaneous performance, many Polish city authorities lack awareness of simultaneous adaptation of cities to climate changes during revitalisation activities. As a result, we have a lot of revitalisation projects which contribute to the intensification of local heat islands or local flooding. Therefore, there is a risk that there will be a need for correction in order to adapt them to the requirements of the plans for adaptation of given cities to climate changes, which will have not only economic, but also social measurable effects. Nevertheless, activities concerning adaptation of cities to climate changes do not consider the social aspect, connected with the achievement of those objectives, which would be significant in transformations of crisis areas as it would protect these people against the aftermath of gentrification. These deliberations will be analysed also for the possibility of implementation of the green infrastructure in urban areas subject to revitalisation or adaptation.

This significant issue will be discussed against an analysis documents concerning the plans of revitalisation of cities and their adaptation to climate changes with regard to Warsaw, Gdańsk and Łódź, where the relevant authorities do not identify the similarity of these processes as well as potential benefits to be derived from their simultaneous conduction with support of and for the benefit of the local communities, using versatile tools, which in this case could include NBS (nature based solutions).

Revitalisation and adaptation of cities

Revitalisation activities in Western Europe were carried out already in 1960s (Leszkowicz-Baczyński, 2019). In Poland, decisions related to transformations of degraded areas started to be made much later – in the 1990s, in the social, spatial and economic sphere. Reparatory activities were mostly focused on central parts of cities (including the historical parts) characterised by buildings erected at the turn of the 19th and 20th century, estates near factories, modernist housing estates, post-industrial, post-railway, post-military or post-port areas (Ciesiółka, 2017).

The Revitalisation Act, enacted only in 2015, pays particular attention to the fact that revitalisation should be a comprehensive tool, which can be achieved by integrating social, spatial and economic activities. These activities are to be carried out through the agency of local communities – stakeholders – in degraded areas, which are considered areas with concentration of negative

social phenomena (unemployment, crime, poverty etc.) (Ciesiółka, 2017). At present, 76% of urban centres in Poland have local revitalisation plans (66.1% of them are the so-called "hard measures") (Leszkowicz-Baczyński, 2019). In many cases, the process – and in turn the funds allocated for it – concern the restoration only of central areas in cities and the public spaces important for the given city. Simultaneously, municipal investments are financed, e.g. infrastructural investments (data indicate that such investments are one of the most important activities in 14,576 revitalisation schemes) (Rewitalizacja. Raport o stanie polskich miast, 2019). Unfortunately, social activities are left out, which stands in conflict, as it were, with the main premise of revitalisation. In turn, not enough importance is attached to investments concerning the closest surroundings of the local communities suffering from a crisis, e.g. modernisation of yards or the recreational areas adjacent to housing estates.

According to numerous examples of activities carried out as part of the revitalisation process, the greenery in the given area is sometimes outright destroyed. This contributes to decreased quality of life in the areas under revitalisation, e.g. by their excessive heating. Therefore, ill-considered investments will contribute to the intensification to the effect of weather events (heat waves or local flooding).

Adaptation of cities to climate changes is, in turn, a process consisting in adapting ecological, social or economic systems to climate changes which have already happened or can happen with high probability (www.ipcc.ch).

In Poland, strategic documents have already been developed that aim to create spatial solutions leading to the adaptation of cities to the current and forecast climate conditions, which affect the health, life and well-being of the inhabitants of given areas. One of the activities in this scope will be the development of the "44 Urban Adaptation Plans – Let's understand the climate!", consisting in developing documents of urban plans for adaptation to climate change for Polish cities of over one hundred thousand inhabitants. The initiator of the project, lasting from 2017 to 2019, was the Ministry of Environment. The main elements of the planwere: assessment of climatic sensitivity of the given cities and the proposal for adaptive solutions addressing specific threats (www.44mpa.pl). Another project worth attention is "Preparation of a strategy for adaptation to climate change of the metropolitan city by means of a climatic map and social participation", "ADAPTCITY" in short, within which the strategy for adaptation to climate change for the capital city of Warsaw by 2030 with a perspective to 2050 was developed. The project lasted from 2014 to 2019 and was implemented by the Capital City of Warsaw, the Ministry of Environment, the Institute for Sustainable Development Foundation, the Union of Polish Metropolises and Verband Region Stuttgart (www.klimada.mos.gov.pl). It included a wide range of scientific and educational activities and numerous publications on the climate of Warsaw were written on its basis (for instance the so-called Climatic Map of Warsaw and the "Warsaw from Space" report).

The usefulness of carrying out adaptation and revitalisation of cities as coincident urban activities

Both the revitalisation of cities and their adaptation to climate change is connected with intervention activities in urbanised spaces of multilayered nature, performed with the participation of local communities. These interventions frequently employ similar tools, namely development of solutions in the area of green infrastructure as well as nature-based solutions. Both processes can lead to similar adverse effects in the form of gentrification.

a) Joint plane for activity – transformations of urban areas

Revitalisation is a process which should not concern single interventions involving renovation of single buildings (which, however, occurs quite frequently in reality) but entire quarters of development along with the surrounding areas. Areas of yards or greenery will be of importance here. The restoration of public spaces is particularly significant if our aim is to improve social aspects by allowing the proper amount of interaction within the given community. The environmental aspect of these activities is important as well (Rewitalizacja. Raport o stanie polskich miast, 2019). The Habitat III document refers to the development of sustainable cities. The topic is also widely covered in EU documents [e.g. the New Urban Agenda, Agenda 2030 or the Leipzig Charter (www.funduszeeuropejskie.gov.pl)]. However, the experience of several years of transformations in Polish cities shows that such revitalisation activities are often carried out where existing lands or facilities of greenery are destroyed and means are not allocated to the modernisation and restoration of recreational areas. The examples of such "anti-revitalisation" are, for instance, the metamorphoses of city squares, which after modernisation become concrete deserts with an "obligatory" fountain here and there.

A good example is the square that aims to shape the new centre of Łódź (Figure 1); the "concrete disease" also involved numerous yards in Łódź, which were restored as part of the scheme for renovating yards in Łódź (Figure 2) or the transformations of Piotrkowska Street, the main artery in the city (Figure 3).

In addition, activities related to the adaptation of cities to climate change to a high extent consist in transforming specific spaces with green or grey infrastructure. This can also apply to defective areas or areas renovated in an ill-considered manner. Too many concrete areas lead to the accumulation of thermal energy, thus leading cities to heat up. Water impermeable surfaces reduce air humidity and have an adverse effect on its circulation and the temperature of the surroundings, which is much higher. Such adverse approach to local climate shaping (which also results from failure to involve individuals and teams dealing with landscape architecture in these important processes – unlike in Germany or the US) and microclimate shaping (Zielonko-Jung, 2013)

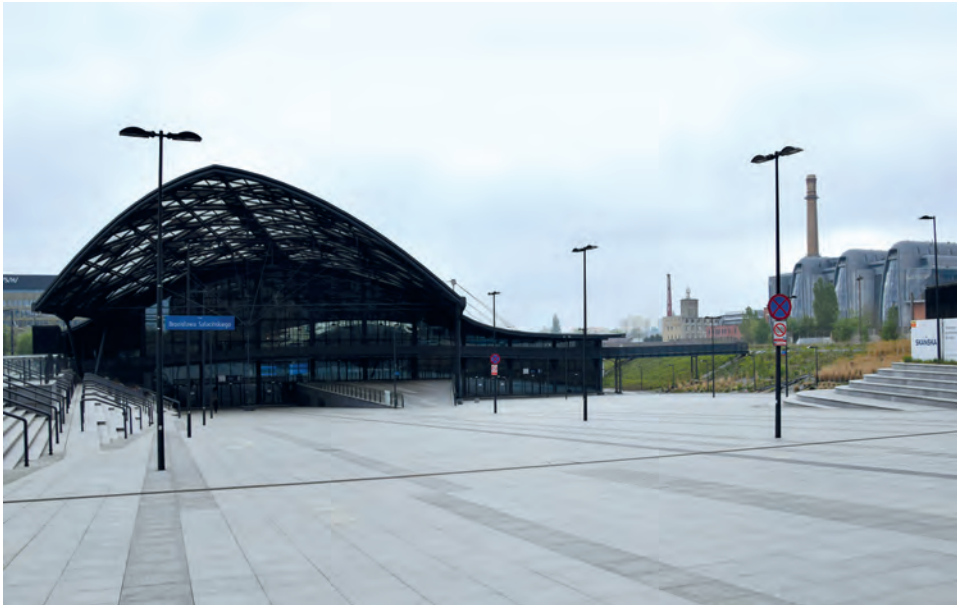


Figure 1. New centre of Łódź

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Figure 2. Renovating yards in Łódź

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Figure 3. Piotrkowska Street

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requires activities involving the introduction of NBS[2] into the urban structures. An interesting example of transformations introduced as part of adaptation, or even revitalisation activities are the investments made in Gdańsk. As part of its activity, the Gdańskie Wody company encourages local communities to build rain gardens. The initiative led to the development of interesting designs – also in areas suitable for revitalisation. A good example could be the design of the rain garden built in the Square of Bishop O'Rourke (Figure 4) or in Zakopiańska Street, near the local community integration homes (Figure 5). A very interesting project is also the comprehensive development of the estate in Stryjewskich Street. It is a modernist estate with panel buildings – the type prevalent in Poland and the entire Eastern Europe, having a lot of space, usually unused and undeveloped. This is where the entire system of rain gardens and bioswales has been located along streets and car parks (Figure 6).

[2] NBS, or nature based solutions, is a more and more popular notion defined by the European Commission (https://ec.europa.eu/info/research-and-innovation/research-area/environment/nature-based-solutions_en) as solutions inspired by mechanisms occurring in nature, which are effective economically and introduce sustainable environmental, social and financial benefits.



Figure 4. Square of Bishop O'Rourke in Gdańsk

Author: Agnieszka Dudzińska-Jarmolińska



Figure 5. Zakopiańska Street in Gdańsk

Author: Agnieszka Dudzińska-Jarmolińska



Figure 6. Bioswales system in Gdańsk

Author: Agnieszka Dudzińska-Jarmolińska

b) Joint plane for activity – taking advantage of the potential of local communities

By definition, revitalisation is a social process – any action is to be taken to help the given community overcome its critical situation which it found itself in for different reasons (unemployment, addictions or poverty). Working on the community as a whole, in contrast to working on individuals, is an important aspect of the process of revitalisation. Therefore, participation activities that build ties between the community members become significant, which in turn allows taking joint action leading to the transformation of the surroundings in the closest proximity. In Poland, revitalisation leads to the supply of designs of yards that are supposed to be not only planned, but also built by the people living nearby. The revival campaign run in the Warsaw district of Praga is such an activity. The initiative led to the development of a yard in Stalowa Street. However, the yard lacked greenery and it eventually degraded again to the point that it does not exist anymore (Figure 7) – the area left behind it is being worked on as part of a developer's investment.

Somewhat in response to the fact that people need and crave greenery in their cities, which need if often omitted in the carried out revitalisation activities, another Warsaw campaign was implemented: "Guardian of the Yard", carried out as an activity encouraging the community living in Strzelecka Street to become more active (https://muzeumwarszawy.pl/straznik-podworka). Children were also encouraged to act. A big plush dachshund became a tool in



Figure 7. Stalowa Street in Warsaw

Author: Agnieszka Dudzińska-Jarmolińska

the initiative: children showed trust in it and eagerly participated in planning new surroundings. Eventually, these activities (dubbed a great success) led to the emergence of concepts for development of that space. The project was carried out in 2016 and gave hope for change, particularly among children. However, nothing changed in the area in question (Figure 8).

Still, revitalisation rarely involves the formation of the so-called social networking gardens, which are an interesting alternative to the traditional recreational areas. They are cheap in construction and maintenance and they do not need much space, but it is imperative to find a charismatic coordination of activities carried out in such gardens – as demonstrated by Karolina Wójcicka, M.Sc. in her studies on the area of Warsaw.

The involvement of local communities in activities to be carried out by them or together with them is an important element of transformations leading to the adaptation of the given city to climate changes. Nature based solutions in the form of rain gardens, green walls and tree planting should be implemented in cooperation with the society. People will feel responsible for the plantings done by themselves and will take care of them. What is more, they can be implemented not only in areas belonging to the city, but also in private or community-owned ones. Such are the transformations occurring in the already mentioned Gdańsk. More and more initiatives are also visible in Warsaw (e.g. not mowing lawns, planting urban meadows, creating infiltration basins) (Figure 9, Figure 10).



Figure 8. Strzelecka Street in Warsaw

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Figure 9. Wilanów in Warsaw

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Figure 10. Powiśle in Warsaw

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c) Joint plane of effects of activities – gentrification

Activities concerning revitalisation or adaptation to climate change can be a cause of many, often adverse, social transformations and formation or escalation of conflicts of different sizes. Therefore, both processes should be planned and pursued transparently and after consultation with as many stakeholders as possible.

Spatial transformations as part of revitalisation of cities and their adaptation to climate change can also lead to the undesirable phenomenon of gentrification, when people of lower financial status who formerly lived in the given space are replaced by people of a higher financial status (the so-called middle class). This affects the spatial transformations of the given districts (Jaskólski, Smolarski, 2016), as well as their development (Jadach-Sepioło, 2007). However, the process is not coordinated and purposeful: it is seen as a negative phenomenon for social reasons (Tobiasz-Lis, 2012).

The process of gentrification also occurs as a result of activities related to transforming given areas so that they are adapted to climate change. The notion of "climatic gentrification" was coined in 2018. Harvard scientists examined social transformations based on changes in house prices in Miami and Florida. In the process, they distinguished three types of areas that can be subject to gentrification (www.sitn.hms.harvard.edu):

– increased land prices in areas not exposed to climate change effects and inhabited earlier by the poorer community, which leads to them being

driven out by communities with a better financial status (www.sitn.hms.harvard.edu);
- in areas attractive to live in but exposed to climate changes, where additional safeguards are necessary due to the threat of such changes – which can be implemented by people with a better financial status (www.sitn.hms.harvard.edu);
- municipal adaptation activities require increased taxes, which in the given area can be handled only by people with a better financial status (www.sitn.hms.harvard.edu).

Therefore, it was observed that certain areas begin to become more valuable than other as they are less exposed to the effects of future natural disasters resulting from climate change. This evokes a migration of people in the given area – people on a lower income are driven out by those better off (www.globalresilience.northeastern.edu).

For this reason, in both cases transformations must be planned and implemented prudently, e.g. by means of greenery. However, these cannot be conventional solutions as they can lead to hypergentrification – that is "green gentrification"; a good example of this is the well-known design of the High Line Park in New York.

d) Joint tools for activities. Greenery as an element of revitalisation and adaptation to climate change

Climate changes are responsible for 467 types of threats which people living in the given area can be exposed to. These include not only threats resulting from the destructive force of elements, but also indirect threats, such as more difficult access to the sufficient supply of food or potable water, as well as health or economic aspects (http://europolis.schuman.pl. In Poland), threats are observed in several planes: heat waves [the temperature in Poland is already growing ca. 0.3°C per decade and the number of hot days with the temperature exceeding 30°C has nearly tripled since the end of the 1980s (www.naukaoklimacie.pl)]; droughts (droughts are more and more frequently occurring in a considerable areas of the country; an extreme example is the drought of 2015, which covered nearly a half, i.e. 44-47%, of Poland) (Somorowska, 2016); a growing number of torrential rains (since 1960s the number of days with high intensity precipitation has grown in a considerable area of Poland (klimada.mos.gov.pl), which leads to floods or flooding (http://europolis.schuman.pl).

To prevent these disastrous consequences of climate changes, it is important to conduct specific adaptive activities, both those extensive – i.e. nationwide, regional and municipal – and a range of smaller local initiatives taken not only by the city (http://europolis.schuman.pl), but also by its inhabitants themselves.

Therefore, activities carried out in the urban space, e.g. as part of revitalisation, in an improper manner can even contribute to the deepening of the climate crisis in cities. This is demonstrated by the current investments involving concreting vast spaces in the city, liquidating green squares, cutting

down trees and planting vegetation inadequate for the expectations arising from the ecosystem services for the given space. Vines growing on renovated buildings are also eliminated and degraded areas/wastelands with diverse pioneer ecosystems growing on them are eliminated to make space for car parks.

The truth is that both processes, the one leading to adaptation of cities to climate changes and the one aiming to move spaces out of undesirable crises, can employ the same tools – nature based solutions, which will simultaneously lead to the improvement in the quality of life in the given area. Such activities will also conform to the EU policy concerning the sustainable growth of cities or to the activities connected with the so-called green deal (activities for climate change and maintenance of biological diversity) (www.ec.europa.eu), where integrated activities are planned on the basis of the holistic approach and cooperation between different disciplines such as climate, environmental, energy, transport or agricultural policy. The European Green Deal starts numerous initiatives, also legislative, that aim to help achieve the goal of the European Union – climate neutrality by 2050 (www.consilium.europa.eu).

Activities connected with revitalisation should, to some extent, be based on introducing specific forms of greenery in urban spaces as well as contribute to the sustainable growth of cities (Dembicka-Niemiec, 2016). Activities dedicated to the restoration of degraded areas should be taken advantage of as an opportunity to introduce elements of green infrastructure in such urban spaces, which will not only improve their aesthetics, but also, for instance, allow developing solutions concerning rainwater management (Lim, 2018) or food production. This also conforms to the premises of the policy of the EU, which recommends introducing nature based solutions that serve to adapt cities to climate changes and use degraded spaces and abandoned areas (Green Infrastructure: Land Revitalization Success Stories, 2014).

Joint activities concerning the transformation of one's closest surroundings also conform to the assumptions of revitalisation schemes, where the social aspect of these activities, encouragement of people to act as well as supporting community formation are significant. These effects can be achieved by, for instance, transforming degraded areas (The Multifunctionality of Green Infrastructure, 2012) and involving communities in such activities. This happened as part of the already mentioned activities carried out in Gdańsk, which consisted in the construction of local rain gardens. (These activities also have educational merit: the local community is supposed to acquire knowledge of how to create such facilities and use that knowledge for the purposes of transformations of other urban spaces).

These are activities which conform to the initiative of forming immunity for socioecological systems. The application of nature based solutions can, therefore, be a positive element, also in economic terms, from the perspective of social sciences (and so it can conform to the premises of revitalisation activities). Improperly selected revitalisation and adaptation activities will result in gentrification (Shokry, Connolly, Anguelovski, 2020).

Conclusion

Both processes, adaptation to climate changes and revitalisation, are similar to each other. The authors, however, strived to draw the reader's attention to their almost complementary and identical nature, which is currently unused. The processes are multilayered undertakings as they include activities concerning transformations of urban areas and affecting the well-being of their inhabitants (both in social and economic terms). The process of revitalisation conduced in a defective or ill-considered manner will result in a situation where financial and social expenditure and the time devoted to the transformation of the given area will be squandered as it will be necessary to modernise the given place to the requirements connected with the adaptation of the given city to climate changes. In addition, the process of gentrification can take place or be reinforced, negatively affecting local communities.

Therefore, we should strive to integrate the processes of revitalisation of cities and their adaptation to counteract climate change, particularly in the case of spaces which become critical areas as a result of delimitation.

As a result, these activities will be carried out in the same planes, with the participation of local communities and the application of the same participation tools and, say, green infrastructure.

Currently, it is difficult to seek synergy between these two types of activities in Poland despite the fact that, for instance Łódź, is one of the largest beneficiaries of funds allocated to the revitalisation in Poland. Warsaw also lacks undertakings directed in such a way, despite the fact that adaptation plans for the capital city were compiled on an individual basis, unlike those for Łódź or Gdańsk. On the other hand, Gdańsk demonstrates that a lot of adaptation initiatives are being introduced in degraded areas, but these are not activities combined with the process of revitalisation.

Bibliography

Bigio, A.G. (2003). *Cities and Climate Change, Alcira Kreimer Margaret Arnold Anne Carlin, Building Safer Cities: The Future of Disaster Risk*. The World Bank Disaster Management Facility, Washington, D.C.

Błaszczyk, M. (2015). Uprzemysłowienie miasta postfordowskiego jako problem polityczny. *Acta Universitatis Lodziensis. Folia Sociologica*, 52, 5–25.

Chądzyńska, E. (2015). Rewitalizacja zdegradowanych przestrzeni miejskich – Studia przypadków. *Studia Miejskie*, 17, 91–103.

Ciesiółka, P. (2017). Rewitalizacja w polityce rozwoju kraju. *Rozwój Regionalny i Polityka Regionalna*, 39, 9–28.

Dembicka-Niemiec, A. (2016). Revitalization actions as a tool to shape a sustainable city (a case study of Opole voivodship, Poland). *Studia Miejskie*, 24, 9–21.

Domański, B., Gwosdz, K. (2010). Spojrzenie na problemy rewitalizacji miast w Polsce. In: Z. Ziobrowski, W. Jarczewski (eds.). *Rewitalizacja miast polskich – diagnoza*. Kraków: Instytut Rozwoju Miast, pp. 45–54.

Górecki, W., Józefiak, B. (2020). *Łódź. Miasto po przejściach*. Wołowiec: Wydawnictwo Czarne.
Green Infrastructure: Land Revitalization Success Stories U.S. Environmental Protection (2014). Agency Office of Solid Waste and Emergency Response, Washington.
Gu, D. (2019). Exposure and vulnerability to natural disasters for world's cities United Nations.
Jadach-Sepioło, A. (2007). Gentryfikacja miast. *Problemy Rozwoju Miast*, 4(3), 66–79.
Jaroszewska, E., Wieczorek, M. (2016). Przemiany starych miast przemysłowych w kontekście koncepcji zależności od ścieżki (path dependence). Przykład Saint-Étienne i Wałbrzycha. *Rozwój Regionalny i Polityka Regionalna*, 32, 107–122.
Jaskólski, M., Smolarski, M. (2016). Rewitalizacja i gentryfikacja jako procesy sprzężone na wrocławskim Nadodrzu. *Studia Miejskie*, 22, 103–116.
Leszkowicz-Baczyński, J. (2019). Ewolucja działań rewitalizacyjnych w Polsce. Przegląd problematyki. *Rocznik Lubuski*, 45(2), 85–103.
Lim, Th.Ch. (2018). Revitalizing urban Neighborhoods by Adopting green infrastructure: the care of Washington DC. *Urban Planning International*, 33(3), 23–31.
Rewitalizacja. Raport o stanie polskich miast (2019), red. W. Jarczewski, A. Kułaczkowska. Warszawa–Kraków: Instytut Rozwoju Miast i Regionów.
Shokry, G., Connolly, J., Anguelovski, I. (2020). Understanding climate gentrification and shifting landscapes of protection and vulnerability in green resilient Philadelphia. *Urban Climate*, 31.
Somorowska, U. (2016). Changes in Drought Conditions in Poland over the Past 60 Years Evaluated by the Standardized Precipitation – Evapotranspiration Index. *Acta Geophysica*, 64, 2530–2549.
The Multifunctionality of Green Infrastructure (2012). Science for Environment Policy, In-depth Reports.
Tobiasz-Lis, P. (2012). Rewitalizacja czy gentryfikacja? Fragment dawnej Nowej Dzielnicy w Łodzi. XXV Konwersatorium Wiedzy o Mieście, pp. 85–96.
Zielonko-Jung, K. (2013). Kształtowanie przestrzenne architektury ekologicznej w strukturze miasta. Warszawa: Oficyna Wydawnicza Politechniki Warszawskiej.

https://www.un.org/en/development/desa/population/publications/pdf/technical/TP2019-4.pdf (access: 17/11/2020).
http://44mpa.pl/miejskie-plany-adaptacji/ (access: 17/11/2020).
http://adaptcity.pl/o-projekcie/zalozenia/ (access: 17/11/2020).
https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_pl (access: 17/11/2020).
http://europolis.schuman.pl/wp-content/uploads/sites/2/2020/10/Raport-Europolis.-Miasta- (access: 17/11/2020).
https://globalresilience.northeastern.edu/climate-gentrification-why-we-need-to-consider-social-justice-in-climate-change-planning/ (access: 17/11/2020).
http://klimada.mos.gov.pl/adaptcity/ (access: 17/11/2020).
http://klimada.mos.gov.pl/zmiany-klimatu-w-polsce/tendencje-zmian-klimatu/ (access: 17/11/2020).
https://naukaoklimacie.pl/aktualnosci/coraz-wiecej-upalow-w-polsce-340 (access: 17/11/2020).
http://sitn.hms.harvard.edu/flash/2019/climate-newest-gentrifying-force-effects-already-re-shaping-cities/ (access: 17/11/2020).
https://www.consilium.europa.eu/pl/policies/green-deal/ (access: 17/11/2020).
https://www.funduszeeuropejskie.gov.pl/media/72565/raport_pl_final.pdf (access: 17/11/2020). https://www.ipcc.ch/site/assets/uploads/2018/03/wg2TARchap18.pdf (access: 17/11/2020).

Abstract

Revitalisation and adaptation of cities in Poland. Inconsistent processes

In Polish cities, one of the most important tasks performed by local governments are the tasks related to leading degraded areas out of their critical condition with revitalisation activities. However, today highly urbanised areas have to contend with new challenges – processes of adaptation of cities to climate changes.

Both activities are similar to each other in spatial, economic, social and environmental aspects, which would allow their parallel initiation in municipal structures. It would contribute to facilitated implementation of solutions both in the area of revitalisation and in the field of adaptation to climate changes. It would also dramatically reduce the costs of such municipal transformations and have a positive effect both on the social and environmental transformations in the city.

Keywords: revitalization, adaptation to climate change, nature based solution

Discount trade in big city space – development or regress of a phenomenon?

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Spatial organization of the trade in Poland

The organization of stationary trade can be based on many criteria, but the basic ones include the form of organization and the size of shops and their offer. In the first case, a distinction must be made between chain stores and those outside organized chains. In the latter case, traditional and self-service shops can be distinguished, including hypermarkets, supermarkets and discount stores. I Convenience shops also belong to this category.

A hypermarket is a self-service shop with the largest area when compared to other types of shops, whose area exceeds 2,500 m^2. Products other than food constitute a major part of those on sale in hypermarkets. Typical examples of hypermarkets in Poland are E. Leclerc, Auchan, Carrefour, Tesco (Wilk, 2013; Gwosdz, Sobala-Gwosdz, 2008). Supermarkets, which have a surface area of more than 400 m^2 but less than 2,500 m^2, due to their size, offer fewer products, and thus food and other items have a similar share in the offer. The examples of supermarket chains are Tesco, Carrefour or Intermarche (Wilk, 2013).

The third type of shops are discounts, which are actually organized as self-service stores. However, these shops are classified not on the basis of their area, but on the basis of the offer. The main feature of discounts is offering goods at relatively lower prices than in other stores (Fuhrmann, 2017). Own brands play an important role in the product range of these shops, but it is not the only characteristic of discount stores. Traditionally, a discount store – apart from the low-price strategy – has been associated with a limited number of employees in one store, the simplest possible decoration and equipment, and, initially, the possibility to pay only by cash. Domański (2005) points to two types of discount stores – soft and hard type, offering a few hundred and over one thousand products.

Retail trade in Poland

The changes that have taken place in Polish trade are mainly related to the political transformation initiated in 1989. With the transition from a centrally controlled economy to a free market economy, private shops belonging not

only to Polish investors began to appear in Polish space. In the mid-1990s the first hyper- and supermarkets of German retail chains were established. At the same time, the first discount stores were opened.

The retail sector in Poland accounts for over 25% of all service sector employees (2019 data). Trade has more than a 15% share in the creation of gross domestic product and nearly a 18% share in the creation of added value of gross domestic product. The value of revenues in the trade sector amounted to PLN 2,056,7 billion, which was 0,7% higher than in 2018; more than 28% of the revenues are attributable to retail trade. The dynamics of goods trade in retail trade in Poland should be considered as high, in comparison to 2015. In 2019 the level of 125% was reached, and only Lithuania, Hungary and Romania achieved higher dynamics in the European Union.

In 2019, a total of 333 thousand shops were operating in Poland (Rynek Wewnętrzny, 2019). The main responsibility for retail sales of goods in Poland lies with business entities employing over 50 people, which account for 54% of all entities involved in the sale of goods. In the structure of a shop size, the largest share is held by shops with an area of up to 100 m^2, but their share has decreased since 2010. However, the share of shops with an area of 400–999 m^2 and over 1000 m^2 has clearly increased. All stores are dominated by general food stores, amounting to 67% of all establishments. Shops owned by foreign enterprises included 18,653 outlets (an increase of 7,8% compared to 2018), accounting for 5,6% of all stores (in 2014 this share was 4,3%) and 31,6% of the stores' sales area. The data indicate a certain concentration of stores with a larger area among foreign entities. The average area of a shop belonging to a foreign company in Poland is over 630 m^2 and the area of a Polish-owned shop is less than 200 m^2 (Rynek Wewnętrzny, 2014, 2019).

Development of discount chains in Poland and Warsaw

As indicated earlier, the first discount stores in Poland started to be established in the mid-1990s. Currently, the following discount store chains are present on the Polish market: Biedronka, Lidl, Netto and Aldi (Table 1).

In total there are 4,283 discount stores in Poland, over 70% of which are owned by the Portuguese company Jeromino Martins. Aldi stores have the smallest share. In 1995 the first shops of the Biedronka chain and the Danish Netto chain were opened, but the development of the latter was not very dynamic, compared to the fastest growing Biedronka chain. The other networks, Lidl and Aldi, appeared in Poland after 7 and 11 years respectively.

The history of discount stores in Poland is rich as the retail market and the retail chain market are changing quite dynamically. Apart from the discount chains mentioned above, 6 other chains were present in Poland (Table 2).

Table 1. Discount chains in Poland in 2000

Brand	Origin	Year of origin	In Poland from	Number of shops in Poland
Biedronka	Polska/Portugalia*	1980	1995	3031
Lidl	Niemcy	1930	2002	723
Netto	Dania	1981	1995	383
Aldi	Niemcy	1913	2006	146

Source: Own study based on: www.biedronka.pl, www.lidl.pl, www.netto.pl and www.aldi.pl (access: 22.11.2020)

*Polish chain Biedronka was bought in 1995 by Jeromino Martins

Table 2. Old discount chains in Poland

Brand	Years in Poland	Capital origin
E-discount	1997–2003	
Leader Price	2000–2007	France
PlusDiscount	1995–2007	German
REMA1000	1993–2003	Norway
Sesam	1996–2000	
Tip Discount	1995–1999	

Source: Wilk W. (2013), Koncepcja sieci a geografia zorganizowanego handlu detalicznego w Polsce, WGSR, Uniwersytet Warszawski

However, the high level of competition in the market and the changing situation of individual companies has led to the collapse of networks or take-overs by other discount chains.

In 2020, 182 discount stores were located in Warsaw, which constitutes 4,2% of all discount stores in Poland. The largest share – as in the case of Poland – is also held by the Biedronka chain, which operates 143 stores in the capital. The second largest is the Lidl chain, which opened 29 stores in the city; 6 stores operate under the Netto banner and also Aldi opened its 4th store in Warsaw in November 2020.

The data presented above clearly show the dominance of the Biedronka chain on the Warsaw market. It is also the chain with the largest share of its outlets in Warsaw – the Biedronka chain has located over 5% of all its stores in the capital. Therefore, it seems interesting to analyze the spatial context of the functioning of this network in Warsaw.

Market and image context of the Biedronka chain

The shops of the Biedronka Jeromino Martins chain were created as typical discount stores, which sold very cheap products and whose product range was very limited. The location factor was primarily the availability of customers with smaller financial resources, for whom the appearance, design and quality of products were not important. Until 2010, the rate of development of this chain was low (Fuhrmann, 2017).

The breakthrough in the development of the Biedronka discount stores chain is somewhat political in nature. In 2011 one of the leading right-wing politicians in the country, critical of the government at that time, made a statement to the public. His statement concerned increases in product prices in Poland. To the argument that the Biedronka chain offers lower prices of products than other shops, the politician replied that Biedronka shops are intended for poor people. This response was widely echoed not only in the media, but above all, in social media, and the inhabitants of Poland did not remain passive towards such a statement. Shopping in Biedronka stores meant opposing right-wing politics. As a result, the wealthy also started to make purchases in discount stores. The situation was also exploited by the chain itself, as shown in Table 3 and 4 (Fuhrmann, 2017).

What has changed since 2011 in Jeromino Martins stores in Poland? The most important changes include:

- change of shops' decoration, moving away from the display of goods on Euro pallets to store shelves,
- more elegant décor in stores and greater care for their cleanliness,
- change of the chain's logotype,
- better display of vegetable and fruit, emphasizing their freshness and Polish origin,
- fresh flowers in the shop offer, located at the entrance to the stores,
- introduction of card and telephone payment; the Biedronka chain was the first store in Poland to introduce the latter,
- introduction of the mobile pre-paid offer,
- significant extension of the product range,
- introduction of branded products,
- introduction of premium brands (food and other products),
- extension of the range of alcoholic products, including the products of well-known brands,
- increase of the share of products manufactured in Poland to 90%,
- extending the activity of the Biedronka brand with the patronage of the Polish national football team,
- organizing competitions for customers, in which prizes are awarded to premium brands products.

Table 3. Characteristics of the Biedronka chain before and after 2011

	Before 2011	After 2011
Customer	Needy, poor	Rich, wealthy
Location	Suburbs, small cities	Suburbs, small, large cities, city centres
Priority	Price	Price to quality ratio
Characteristic	Price subordination, violations of employee rights, raw design of stores	– Card and telephone payment – Premium brands in the offer – High attractivity of locations of stores

Source: Fuhrmann 2017

Table 4. Biedronka chain stores profile

Discount store feature	Presence of that feature in the Biedronka chain	Comments
Low price strategy	Yes	The low price strategy is the basic characteristic, however there is also reference to the quality of products
Limited product offer	No	Food products of better quality and non-food products, including those of well-known brands, are present
Reduced degree of customer service	Yes / no	New forms: smartphone apps, contests at some of the shops, in some sections products are weighed with staff in attendance
Simplified display	No	This change is mainly visible in the fruit and vegetables section, and in the weighed products section; it is also visible in the fact that Europallets are no longer being used
Own brands	Yes	Still present in the offer, high quality
Cash payment only	No	Payment with card and phone (NFC)

Source: Fuhrmann 2017

The spatial and social phenomenon of the Biedronka chain in Warsaw

Currently there are 143 Biedronka stores in Warsaw. This is 43% more than in 2015. However, the development of this chain in Warsaw was very slow. The first store in Warsaw was opened in 1996, i.e. only one year after the chain was established in Poland. The store was located in the Mokotów district, in a prefabricated housing estate from the 1970s. This housing estate is part of the 20th

century city, inhabited by people who are less affluent and of a higher average age. At that time, shops of the Biedronka chain were established mainly in small towns and in the suburbs (Fuhrmann, 2017). Until 2000, there were a total of 8 shops in Warsaw and, with the exception of Mokotów, shops were located far from the city center.

In following years, the development of the Biedronka chain in Poland and Warsaw clearly accelerated. After the next 15 years, 39 Biedronka shops were already operating in Warsaw. At that time, shops already started to be located closer to the city center or in Śródmieście district. The discounts also started to be created in district inhabited by the economically better off population. At the same time, no shops were established in Żoliborz and Rembertów.

The largest development of the chain occurred in the period after 2010. At the beginning of 2015, there were already 100 stores, and by 2020 a total of 143. For the 2011-2020 period, over 75% of all stores operating in Warsaw were built. Currently, the Biedronka chain stores are located in every district. Most shops are located in Praga Południe (11,9%), Śródmieście (11,2%) and Mokotów (10,5%). Praga Południe is one of the largest residential districts with many prefabricated and modern housing estates. Mokotów is a demographically old residential district, yet densely built-up, where it is difficult to find plots of premises, but the Biedronka chain locates its shops mainly in new residential developments. The Śródmieście district is a big surprise. While the other Warsaw districts mentioned above have a residential character, the Śródmieście district is the one with the most central location and many functions – other than housing. The biggest surprise may be the location of the discount store in the historic part of the city – in Nowy Świat Street and near the Old Town Square. Many Biedronka stores are located in other intensively developing districts, Wola and Białołęka. However, Biedronka shops also open in districts with a growing share of people with higher earnings, which seemingly contradicts the brand image. Traditionally, the shops of Biedronka chain (but also Lidl and Aldi) are associated with customers for whom the priority is low price rather than product quality.

Most of the Biedronka chain shops open in 2015 and in 2020 were located in the vicinity of multifamily residential buildings. Have there been any changes in the locations of shops over the past years? The share of shops located in the vicinity of single-housing buildings has clearly decreased – in 2015 it amounted to 11%, in 2020 it decreased to 6,3%. However, the share of shops located in the vicinity of office buildings has clearly increased, thus providing a solution to the issue of everyday shopping by office workers. However, combinations of a discount store and office buildings where multinational corporations are based may come as a big surprise. Both in 2015 and 2020, a large proportion of stores were located in an environment that has many functions, not only residential.

The first Biedronka shops were located in existing commercial buildings (pavilions) on prefabricated housing estates (Figure 1).



Figure 1. Classic yellow building of Biedronka store

Author: M. Fuhrmann

or in detached buildings with a characteristic appearance (Figure 2).



Figure 2. Biedronka store located on the ground floor of a block of flats in the Miasteczko Wilanów housing estate in Warsaw

Author: M. Fuhrmann

In 2015 the biggest number of shops represented the latter type of location (Table 5).

Table 5. Functions in the store's surroundings in 2015 and 2020

Store surroundings	2015	2020
Multi-family housing development	57,0%	55,0%
Single-family housing development	11,0%	6,3%
Mixed housing development	9,0%	9,4%
Services	2,0%	3,8%
Postindustrial	1,0%	1,3%
Offices	1,0%	6,7%
Mixed functions	19,0%	17,5%

Source: Own study

Over the past few years this trend has been weakening – 38% of shops have operated in a detached building. The number of shops using existing commercial and office buildings has increased. Shops were also built on the terrains of successive railway stations and in shopping centers. A Biedronka shop is located at the Central Railway Station (Figure 3), Eastern Station or in a large shopping center – Galeria Młociny (Table 6).



Figure 3. Biedronka chain store located in a former commercial pavilion in a prefabricated housing estate in Bielany in Warsaw

Author: M. Fuhrmann

Table 6. Buildings with Biedronka stores in Warsaw in 2015 and 2020

Otoczenie sklepu	2015	2020
Detached building	46,0%	38,0%
Housing estate building	26,0%	28,2%
Shopping building	17,0%	20,4%
Office building	7,0%	8,5%
Shopping center	3,0%	3,5%
Railway station	1,0%	1,4%

Source: Own study

The spatial development of the Biedronka chain in Warsaw shows the importance of residential areas. Warsaw is a city with a constantly growing number of inhabitants, which results in high demand for flats, which is why the residential real estate market is developing very intensively. When designing new housing estates, developers plan services and commercial spaces on the ground floors of residential buildings. Such facilities have become a very attractive alternative for the Biedronka chain to build detached buildings on undeveloped plots. In the case of new housing estates, there is no need to purchase a plot of land and build a facility, all that remains is to lease existing commercial space. This makes Biedronka shops, although arranged in a similar way, differ in size, spatial arrangement andproduct range.

An interesting example of the spatial development of the Biedronka chain in Warsaw, as well as a change in the attitude of the residents to the chain's shops is Miasteczko Wilanów (Wilanów Town) estate. It is a completely new part of the Wilanów district with the domination of the residential function, but with a precisely defined share of the remaining necessary functions. It was planned as a complex residential area, where residents will satisfy as many of their needs as possible, including commercial, educational, recreational services and many other (Fuhrmann, 2019). Miasteczko Wilanów is perceived as one of the best developed housing estates in Warsaw, as well as a higher standard estate, as evidenced by higher real estate prices than in other parts in Warsaw. In 2012, it was announced that the Biedronka chain decided to open its shop in Miasteczko Wilanów. This information was met with great outrage and protests of the inhabitants. As an argument against the opening of the shop, it was argued, among others, that "a cheap supermarket does not fit into this housing estate" (Gazeta Wyborcza, 4.09.2012) or "after all, it is shop for poor people that does not fit here" (Na Temat, 5.09.2012). At that time, the chain's stores were associated only with poorer part of society and with cheap products (which began to change slowly after 2011). Some residents were afraid that such a shop with such products would attract customers from the vicinity of Miasteczko Wilanów, which could not meet with the approval of the



Figure 4. Biedronka shop in the Central Railway Station in Warsaw

Author: M. Fuhrmann

residents. However, by 2020, 3 stores of the chain were opened in Miasteczko Wilanów itself (Figure 4), including one with an underground car park.

There are 3 additional stores in the vicinity of Miasteczko. Observing the traffic in the stores one can come to a conclusion that, first of all, there are no "undesirable" customers from the vicinity of Miasteczko purchasing cheap products, including alcohol and "worsening" the image of the estate. Secondly, the customers of the stores are the residents of Miasteczko Wilanów, who have significantly changed their approach to the chain, which was obviously related to the changes that were made to the chain's offer (it was discussed in the previous part of the article).

In conclusion, it is also worthwhile to look at the distribution of the Biedronka chain stores in relation to the distribution of the population and the population over 65 (Biedronka is a store popular among the elderly). For this purpose, the demographic quotient of the location of the chain's stores in Warsaw was calculated (Table 7).

Out of 18 districts of Warsaw, the number of shops of the Biedronka chain in 10 is higher than it results from the share of the population of the district. Interestingly, the Wilanów district (1,86) and the Śródmieście district (1,72) have the largest number of stores in relation to the population. This is quite a surprise, as Wilanów is considered to be a more prestigious district and Śródmieście is a district whose main function is not residential. In relation to the number of inhabitants, fewer stores are located in typical residential

Table 7. Demographic quotient of the location of the Biedronka stores in Warsaw in 2020

District	Demographic quotient of the location	
	Population	Population over 65
Bemowo	0,80	0,83
Białołęka	1,20	2,82
Bielany	0,66	0,56
Mokotów	0,86	0,72
Ochota	0,75	0,68
Praga-Południe	1,18	1,09
Praga-Północ	1,16	1,22
Rembertów	0,51	0,61
Śródmieście	1,72	1,39
Targówek	0,70	0,63
Ursus	1,03	1,34
Ursynów	0,74	0,77
Wawer	1,13	1,30
Wesoła	1,47	2,01
Wilanów	1,86	3,36
Włochy	1,16	1,33
Wola	1,15	1,09
Żoliborz	0,48	0,43

Source: Own study

districts – Bemowo, Bielany, Mokotów, Ochota, Targówek or Ursynów. It is also worth noting where the oldest part of the population has the best access to Biedronka chain stores. Such districts include Białołęka, Wesoła and again Wilanów. These are the districts with the lowest share of older people in the total population – Białołęka (6%), Wesoła (14,8%) and Wilanów (11,2%). In districts with a high proportion of elderly people, the availability of Biedronka shops is much lower – a good example is Mokotów, where the elderly make up 24,3% of the population, and the location indicators reache 0,86 and 0,72 respectively.

Conclusions

Discount chain market in Warsaw is developing very dynamically and the Biedronka chain is still attracting attention. This chain's development after 2010 is clearly accelerating, but in the period 2015–2020 the number of stores

increased by more than 40%. Shops of this chain are present in each district, and on average one store is located per 3,2 km^2 of the city area, which is 36% less than in 2015. Shops of the discussed chain operate in central parts of the city (Śródmieście, Mokotów, Żoliborz). Discount stores also accompany other services, not only commercial ones. An important architectural feature is the form. There is a move away from the classic architectural form of a discount store – a detached building with bright colors. The chain continues the trend of shop individualization. The architectural form of the shops is adapted to the surroundings. More often than before, premium products appear in the product range of Biedronka shops, the last example being the Emporio Armani brand. The conducted research has confirmed further development of the chain and indicates further development opportunities, including strengthening the position of discount stores in the city center. One can also have the impression that Biedronka chain stores, traditionally understood as discount stores, will look for two groups of customers: one for whom the chain's stores will become a place to do everyday shopping, and the other for whom they will become a place to do necessary shopping near their workplace. For some people Biedronka may become a shop located "on the way". What the studies from 2015 and 2020 have in common is drawing attention to the better integration of Biedronka shops into the city space, adapting the form of shops to the surrounding, which is practically not the case with other discount chains. The Biedronka chain is more flexible in its approach to the form of a shop and the location of the shop itself is more important, as evidenced by the use of existing commercial premises on the ground floors of residential buildings. This approach enables the chain to locate its stores in areas of new residential development in Warsaw where it is difficult to find free plots for development. Looking at the intensity of the chain's development in Warsaw, one can say that Biedronka store has become a permanent element of Warsaw's space.

Bibliography

Domański, T. (2005). *Strategie rozwoju handlu*. Warszawa: Polskie Wydawnictwo Ekonomiczne.

Fuhrmann, M. (2017). Discount stores in a large city – the "biedronkisation" of the urban space – the case of Warsaw. *Urban development Issue*, 53, 47–56.

Fuhrmann, M. (2019). Spatial, social and economic dynamic of contemporary Warsaw – City profile. *Cities*, 94, 286–295.

Gwosdz, K., Sobala-Gwosdz, A. (2008). Geografia hipermarketów w Polsce: strategie lokalizacyjne. *Przegląd Geograficzny*, 80(4), 515–539.

Rynek wewnętrzny w 2014 roku. *Informacje i opracowania statystyczne (2015*). Warszawa: Główny Urząd Statystyczny.

Rynek wewnętrzny w 2019 roku. *Informacje i opracowania statystyczne (2020)*. Warszawa: Główny Urząd Statystyczny.

Wilk, W. (2013). *Koncepcja sieci a geografia zorganizowanego handlu detalicznego w Polsce*. Warszawa: WGSR Uniwersytet Warszawski.

http://www.marketing-news.pl/message.php?art=45222 (access: August, 2016).
www.stat.gov.pl (access: August, 2016).
https://natemat.pl/29943,w-ekskluzywnym-miasteczku-wilanow-nie-chca-taniej-biedronki-a-inni-polacy-nie-lubia-za-sciana-smrodu-i-halasu# (access: October, 2020).
https://warszawa.wyborcza.pl/warszawa/1,54420,12422553,Biedronka_w_Miasteczku_Wilanow__Mieszkancy_poruszeni.html (access: October, 2020).

Abstract

Discount trade in big city space – development or regress of a phenomenon?

The article is a continuation of the discussion on the place of discount stores in urban space on the example of the Biedronka chain in Warsaw. The first research in this area was undertaken by the author of the article in 2015. This article presents the state as of 2020 and changes in the development of the discounting network in relation to urban space. Warsaw was used as the research field as it is the largest trade market in Poland as well as the arena of the greatest spatial changes related to the development of trade. The study focused on the location of shops, their surroundings and their architectural form.

Keywords: urban space, trade, trade chains, discount store

Architecture styles in the process of spatial nationalization on the example of interwar Bydgoszcz

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In the years between the First and Second World War, Polish cities had little in common with one another in terms of architecture. From the first days of independence, a common identity code was sought to demonstrate that it was Poles who were the hosts of the above centers. Therefore, the new states like Poland that emerged as a result of the collapse of empires often tried to cut themselves off from the heritage of the former powers. New styles easily developed in those states whose nations were victims of denationalization in imperial times (Germanization, Russification, Magyarization). At the same time, some of the architects around the world advocated radical changes in the field of design, claiming that the traditional architectural and urban solutions had not been effective. In some countries and their cities, new ideas marked a new beginning in the era of the rising nationalism in Europe (Dąbrowska-Milewska, 2009, p. 5–11).

The interwar Bydgoszcz was like a theatre of those changes – this city was a place of contrast: the Poles and the Germans lived next to each other and each group considered Bydgoszcz as theirs only (either Polish or German).

Until the end of World War I, the city was under Prussian control and was one of the main administrative, industrial and military centers of Eastern Germany. Quite quickly it was almost fully Germanized (as opposed to Poznań), and, through subsidies from contributions after the victorious war between Prussia and France, it developed very dynamically, earning the nickname of *klein Berlin* (Loose, 2006, p. 73–80). The most eminent architects (such as Święcicki and Lepcke) were active in Bydgoszcz, and at the beginning of the 20th century, efforts were made to design subsequent quarters of the city according to the principles of the "garden city". Moreover, the German authorities implemented the *Hebungspolitik* program which was one of the symbolic elements of the Germanization policy aimed at Poles (Jastrzębska-Puzowska, 2006, p. 51–52). In addition, buildings from the Polish-Lithuanian Commonwealth period were dismantled and the Poles were not allowed to build Catholic churches (in 1914 there were only two Polish churches). As a result, Bydgoszcz resembled other North German cities in terms of form and organization – saturated with the Germanic national style, full of objects related to German symbolism. During

the German rule, there were numerous implementations in the spirit of the so-called German national style which was a characteristic neo-Gothic, combining certain elements of Dutch mannerism and traditionally Gothic features. The most representative buildings in Bydgoszcz, frontages of tenement houses and villa estates were built in this style until the end of World War I (Figure 1) (Bręczewska-Kulesza, 2004, p. 69–94).



Figure 1. Main building of former Prussian Eastern Railway Headquarters in Bydgoszcz

Source: Narodowe Archiwum Cyfrowe

A local version of German Art Nouveau in architecture was created and far-reaching plans for the city's development were formulated with detailed guidelines (Jastrzębska-Puzowska, 2005, p. 42–46). This period, iconic and written in all *Belle Epoque* syllables, ended with the beginning of the First World War. Since then, the city's spatial development nearly stopped. The city, though unaffected by the war, suffered from numerous reshuffles during this period. Due to the change of state membership, subsidies from the Berlin government disappeared and local German architects and urbanists emigrated (Germans in interwar Bydgoszcz constituted about 10% of the city population) (Kutta, 1992, p. 121–135). They were replaced by Polish immigrants from all three partitioned lands. Moreover, the status of the administrative region capital city was lost to Poznań and Toruń (Grzegorz, 1996, p. 3). Due to these difficulties,

the first decade of the interwar period in Bydgoszcz was marked by investment stagnation, despite the fact that the city was considered one of the best organized cities in the country[1]. Furthermore, this stagnation began to generate an increasingly troublesome shortage of flats. In extreme cases, there were supposed to be 5-10 people per room and the population density in the center was about 11,000 people/1 km^2. The social pressure was increasing every day and the modest municipal investments of that period did not help. The first city development plan after World War I was devised in 1928 (Wysocka, 2015, p. 32). Polish plans were quite consistent with the Prussian way of thinking while also containing innovative architectural elements. However, a program of densifying the buildings was implemented which assumed: firstly, the removal of the poor-quality buildings in the city center that had not been replaced in Prussian times; and secondly, the development of empty plots in line with the principle of "neighborly compliance". Another aspect is related to the search for the reasons for creating the downtown space in a specific way. In the interwar Bydgoszcz, two distinctive styles (that were later labelled as national) dominated the local architecture: the so-called "manor style", which is a Romantic reference to the noble houses popular in the 1920s; and functionalism, which is a variety of modernist architecture. In the former case, the architects intended to refer to the noble tradition; in the latter they were motivated by innovation. This innovative movement was widely approved by the Bydgoszcz citizens, especially young people who wanted to be cut off from the German past. According to some memories from that period this enthusiasm was even supposed to take form of a kind of a "cult" (Raszewski, 1994, p. 388–389). Functionalism was one of the more radical versions of modernism at this time, represented in the interwar Europe mainly by the German Bauhaus School, Le Corbusier, and several Polish and Czechoslovak architects. Schools of this trend called for breaking up with the contemporary approach to architecture, postulating the abandonment of the use of details (e.g. portals, ornaments) and designing asymmetrical shapes, often with rounded corners. In addition, a popular solution was to install a large number of windows. It was a novelty, even in relation to Art Deco or the first buildings of the early modernist style from the second decade of the 20th century. Thanks to this innovation, in some countries functionalism was treated as a tool for enabling the modernization of countries and in the new states – the creation of their own independent heritage.

The Polish contemporary version of functionalism in Bydgoszcz was introduced slowly, beginning mainly in the 1930s, but then completely dominated the architects' designs. Wherever buildings served as a filling of a void, they blended well with the neighboring ones. The main examples of this solution could be seen in the vicinity of the Old Town at the addresses of Bernardyńska 1 or Niedźwiedzia 7 streets and along Gdańska Street (Wysocka, 2015, p. 100). Moreover, the main seat of the Pomeranian Automobile Center

[1] Jak wyglądają miasta polskie (1926). W: *Czas*, r. 79, nr 113, s. 3.

at the Freedom Square was built in another version of modernism – internationalism. The local authorities maintained a modernization program for the old frontage buildings. The intention was to complete the project started in the 1890s by Prussian town urbanists. The aim was to replace the buildings of low or insufficient functional quality. Besides, high sanitary standards were introduced into new buildings in a way similar to old Prussian law; these included, for instance, separate bathrooms for each apartment (in some cases for 3 apartments; Wysocka 20) (Wysocka, 2015, p. 100). The aesthetic unification of buildings was also sought. This included, for example, the number of stores and the architectural style as well as the functions of the buildings, mainly in the most representative streets – Gdańska and Dworcowa. Nevertheless, in contrast to many centers of other cities, there was no great need for modernization or renovation of large-scale buildings in the center of Bydgoszcz as these was relatively new and were several years old on average. However, there were other streets that had space reserves. In order to make the city denser, the authorities allowed the construction of tenement houses. These were built mainly in the eastern part of the city center – on the 20 stycznia 1920, J. Zamoyski, I. Paderewski and M. Piotrowski streets (Figure 2). In places where larger functionalist buildings were erected, they began to play a primary role in the local land use. In addition, plans were in place for the construction of the first city skyscrapers, including a new modernist town hall. However, due to financial difficulties and the outbreak of World War II, the project did not come to life. The complex was to be concentrated in the vicinity of undeveloped land at K. Libelt Street (Wysocka, 2015, p. 102).



Figure 2. Western frontage of interwar tenements on the 20 stycznia 1920 Street

Author: Jan Szczepański

The most numerous solutions of this type were implemented in the eastern part of the city center in the area of the former German "garden suburb", which was a certain *Hempelscher Felde*, especially with its central part, the so-called An Idyll that the Germans planned according to the rules of the garden suburbs. Due to the events of World War I, Germans built five villas in the Art Nouveau style, but other construction works were interrupted in 1916, and because of the aforementioned city economic problems, construction was resumed in 1927 (Wysocka, 2015, p. 65-73). The buildings from 1927-1939 were mostly designed in the manor house and functionalist styles (Figure 3 and Figure 4).



Figure 3. An example of a comparison of two villas. On the left in the manor style; in the background on the right in functionalist style

Author: Jan Szczepański

At that time thirteen villas were built in the manor house style (since the late 1920s until early 1930s) and twenty-five in the functionalist style (since the early 1930s until 1939) (Wysocka, Bręczewska-Kulesza, 2004, p. 57-75). The shape of the Idyll's buildings reflects the architectural trends of that time. It was also where the city elite lived. From the west, the Sielanka was built up with frontages of large-city buildings, facing the Weyssenhoff Square and villas of another urban layout in the Ossoliński Alley. Other styles were not as popular: for example, Art Deco was treated withreserve. One of the few, although impressive, buildings in this style was erected at Podgórna 5.

The popularity of historicism (the main style before 1918) slowly faded in the city in the 1920s. At the same time, the former city hosts, the Germans, who remained in the city, tried to erect buildings referring to the past Prussian times. From their perspective it was very important in the context of keeping their national identity and the atmosphere of the city. In the interwar period



Figure 4. Example of the interwar (1930s) functionalist architecture villas on Ossoliński Alley

Author: Jan Szczepański

the few architects of this nationality did not have a decisive influence on the creation of space. The most famous example is the German *Albert Dürer Schüle* from 1938 at K. Chodkiewicza Street, which was the largest facility of this type built for Germans in the interwar Poland (Figure 5). In addition, these activities were supported by the Third Reich government, contrary to the innovative approach of modernism in the version of the Bauhaus School. In the mid-1930s there was an open conflict between the German minority and Polish protesters who demanded a ban on erecting buildings associated with the old era (especially buildings that were not plastered or were built from bricks and had sloping roofs) (Wysocka, 2015, p. 159–160). Importantly though, there was no aversion to the already existing buildings that were built in German times. Contrary to the post-World War II period, the Polish inhabitants of the city and the local authorities in the interwar period were able to rise above the ideology. They greatly appreciated the aesthetic values and the beauty of the buildings and premises created by the Prussians. However, at the same time the Polish part of society believed that this period was over and only a new (Polish) chapter should be continued.

Despite these explanations, comparing the buildings of Polish and German schools from that period highlights a symbolic difference between them. The aforementioned protests of the Poles and the aspirations of the Germans confirm the assumption of hidden nationalism in architecture. It should be noted that the presented objects did not have any external details in the form of sculptures, and the conflict consisted of an unambiguously nationalist interpretation by both nations of the way of thinking about the shape of the solids or the material used.

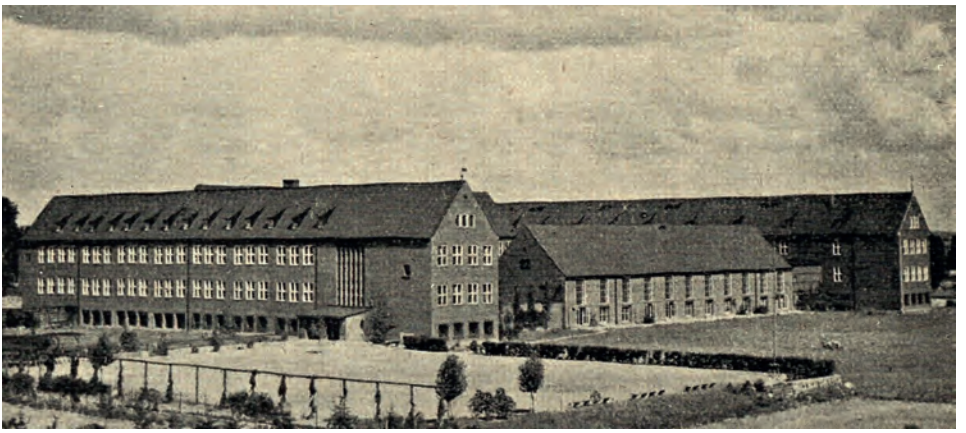


Figure 5. Complex of *Albert Dürer Schüle*

Source: Cyfrowa Biblioteka Narodowa Polona



Figure 6. Maria Skłodowska-Curie Public county school

Source: Narodowe Archiwum Cyfrowe

The authorities of Bydgoszcz at that time issued resolutions banning the old style, relying on President Mościcki Regulation[2]. The decision was dictated by the fact that Bydgoszcz was considered as a city where architecture,

[2] Rozporządzenie Prezydenta Rzeczypospolitej z dnia 16 lutego 1928 r. o prawie budowlanem i zabudowaniu osiedli.

urban solutions and symbolism were full of the Prussian spirit of Germanization. Moreover, local authorities wanted to prove how a forcedly Germanized city can quickly become a stronghold of Polishness. Due to the unequivocally associated Germanic character of the buildings, the Polish authorities motioned for the Polonization of the city space, also in terms of implementing new architectural trends aimed at giving a more Polish tone to it (Figure 6). On the other hand, there was a widespread appreciation of its picturesque nature, beautifully bathed in lush, well-kept green space. The authorities often explained that the local society had to use the city's development and potential and draw from the conditions and the folklore they had created, to prove that Bydgoszcz residents could take care of themselves. In addition, the city was predisposed, in its inhabitants'opinion, to the role of the host of Pomeraniaas the largest city in the north-west of Poland. However, unlike in Toruń or Poznań (which were capitals of their respective regions), in Bydgoszcz the country authorities rarely commissioned the construction of new administrative facilities. For this reason, administrative buildings in Bydgoszcz were built only out of necessity on the grounds of state. Only two completely new government administration facilities were built at that time: a residential and an office building of the 3rd Division of the Second Branch (intelligence & counterintelligence) on S.A. Poniatowski Street. It is worth noting that the city undoubtedly benefited from the state-wide investments. In addition, due to the convenient railway infrastructure and the addition of a coal line from Silesia to Gdynia, a new building of Rail Post on Zygmunt August Street was built in 1935 (Figure 7) and a year earlier the Bydgoszcz branch of PAST was opened on Pomorska Street (Wysocka, 2015, p. 149–153). As a result, the situation of Bydgoszcz in the field of telecommunications and logistics and its role as a postal communication node on a national scale improved.

As mentioned earlier, although the city could not count on financial support from the state, it implemented its public projects, developing its service offer in several areas. In the years 1928–1937 a very important construction of a new city hospital was carried out. It was located east of the city center, on M. Skłodowskiej Curie Street (Figure 8).

Compared to the existing hospital on Gdańska Street and other large buildings, the new construction stood out as monumental. Indeed, it was the most modern and largest hospital in the interwar Poland which would ultimately provide places for the whole of Pomerania. It is important to add at this point that the hospital designer, Bogusław Raczkowski, drew inspiration for the design from the architectural experience used in the Weimar Republic and later in the Third Reich, adding to it the aforementioned characteristic solutions that were mainly used in Poland. Other municipal investments that fit into the style of functionalism are also noteworthy: the first long-distance bus station in Bydgoszcz was built in 1935 at the Kościeleckich Square. Previously, buses were parked in front of the Main Post Office building on Old



Figure 7. Building of the Rail Post

Source: Narodowe Archiwum Cyfrowe



Figure 8. The biggest hospital in Bydgoszcz on Karola Chodkiewicza Street

Source: Narodowe Archiwum Cyfrowe

Port Street. However, it was a fairly modest facility that very quickly turned out to be ineffective[3].

It is worth noting that each of the investments mentioned was unique. Scientific associations connected with the city eagerly boasted about these

[3] Otwarcie dworca autobusowego w Bydgoszczy (autor nieznany). *Kurjer Bydgoski*, 01.01.1934, nr 1, s. 5.

achievements in their publications, despite the fact that, for the city with 140,000 inhabitants, these investments were insufficient in their number. However, from the perspective of this text, the narrative context adopted by the authors of the mentioned publication is very important. In the most famous publication called "Polska Bydgoszcz: 1920–1930. Dziesięć lat pracy twórczej", all the projects from 1920 to 1930 are listed (Nowakowski, 1930). Their role in building the Polish tone of the city is emphasized. This is the key argument that is like an interpretative signpost for people who want to understand the way of thinking of the Polish residents of Bydgoszcz at the time. It is worth mentioning that these investments still play an important role in the Bydgoszcz landscape. The Idyll is one of the most beautiful locations in the city, recommended for tourist purposes. The hospital on M. Skłodowskiej-Curie Street is still one of the largest in the city and its vicinity. In turn, according to the inhabitants and local researchers, tenement houses from that time are such successful projects that, together with buildings from German times, they create a harmonious third version of Bydgoszcz spatial identity: Polish-German.

Summary

Several conclusions can be drawn from the arguments presented above. The interwar Bydgoszcz had lots of management and financial problems, having lost most of its strengths. The city needed facilities that were not built before World War I, such as a new hospital, houses, flats or schools. Moreover, due to technological progress and demographic growth, the demand for new facilities increased further. The interwar publications emphasized the importance of each investment carried out despite these problems. As a result of the ethnic re-Polonization of the city, there was a need to construct "Polish" buildings and "Polish" spaces "for Poles", which would be associated with the modern spirit of the city. Interestingly, unlike, for example, the Main Railway Station in Warsaw, Bydgoszcz projects were devoid of obvious symbolism in the form of details; the characteristic shape of the object was enough. The popularity of the manor house style ended with the onset of the Great Financial Crisis, while the Bydgoszcz interwar functionalism disappeared with the outbreak of World War II. Through the investments of the 20 years of the interwar period, not only were there many gaps in the buildings filled, but the buildings in Bydgoszcz were given more architectural diversity and a very characteristic Polish tone that had been marginalized under the German rule. Changes took place on at least two levels: functional and symbolic. Presently, many of these constructions (e.g. the villas of the Idyll) are even iconic and permanently fit into the city landscape, especially the downtown. In addition, they are highly rated by residents and local experts for their high values and, paradoxically, harmonious coexistence with the

post-German buildings, which is rare for buildings constructed after the Second World War (with the exception of the Polish Theater and the Pomeranian Philharmonic).

Bibliography

Source materials

Jak wyglądają miasta polskie (1926). *Czas*, r. 79, nr 113, s. 3.

Nowakowski, S. (red.) (1930). *Polska Bydgoszcz: 1920–1930. Dziesięć lat pracy twórczej*. Bydgoszcz: Wydawnictwo Jubileuszowe Komitetu Obchodu Dziesięciolecia Oswobodzenia Miasta Bydgoszczy.

Otwarcie dworca autobusowego w Bydgoszczy (1934). *Kurjer Bydgoski*, nr 1, s. 5.

Rozporządzenie Prezydenta Rzeczypospolitej z dnia 16 lutego 1928 r. o prawie budowlanem i zabudowaniu osiedli.

Monographies

Jastrzębska-Puzowska, I. (2006). *Od miasteczka do metropolii. Rozwój architektoniczny i urbanistyczny Bydgoszczy w latach 1850–1920*. Bydgoszcz: Wydawnictwo Mado S.C.

Raszewski, Z. (1994). *Pamiętnik Gapia*. Bydgoszcz: Wydawnictwo Pomorze.

Wysocka, A. (2015). *Architektura i urbanistyka Bydgoszczy w dwudziestoleciu międzywojennym*. Lublin: Wydawnictwo KUL.

Joint publications

Grzegorz, M. (red.) (1996). Bydgoszcz w latach I Wojny Światowej oraz w okresie przełomu (1914–1920). *650 lat praw miejskich: zbiór artykułów*. Bydgoszcz: Wydawnictwo Uczelniane WSP.

Loose, I. (red.) (2006). Polacy i Niemcy w Bydgoszczy. Sympozjum 20 kwietnia 2006. Bydgoszcz: Muzeum Okręgowe im. Leona Wyczółkowskiego w Bydgoszczy.

Articles in magazines or academic journals

Bręczewska-Kulesza, D. (2004). Nowoczesna dzielnica mieszkaniowa z początku XX w. *Kronika Bydgoska XXVI* (s. 69–94). Bydgoszcz: Towarzystwo Miłośników Miasta Bydgoszczy.

Dąbrowska-Milewska, G. (2009). Architektura w kontekście tożsamości miasta. *Zeszyty Naukowe Politechniki Poznańskiej. Architektura i Urbanistyka*, z. 19, s. 5–11.

Jastrzębska-Puzowska, I. (2005). Czy istnieje „bydgoska" secesja? *Materiały do dziejów kultury i sztuki Bydgoszczy i regionu*, z. 10, s. 42–46.

Kutta, J. (1992). Społeczeństwo Bydgoszczy w latach 1920–1939. Część III. W: *Kronika Bydgoska*, t. 14, s. 121–135.

Wysocka, A., Bręczewska-Kulesza, D. (2004). Wille na Sielance. *Kronika Bydgoska*, t. 25, s. 57–75.

Abstract

Architecture styles in the process of spatial nationalization on the example of interwar Bydgoszcz

This article attempts to stimulate the discussion on the causes, ways and effects of implementing the idea of new architectural styles (mainly functionalism) in Bydgoszcz during the Second Republic of Poland. Bydgoszcz was one of the largest Polish cities at that time. The article's main focus are aspects related to construction investments from the late 1920s to 1939 and an emphasis on their architectural style on the basis of non-obvious national subtext. The author lists the most important conclusions, and briefly characterizes them. Moreover, he finds and shows evidence that the new facilities, apart from their useful and necessary functions for the city's development, also played a symbolic role in building a completely new part of identity. This combination finally creates the unique Bydgoszcz atmosphere and recalls times of hidden nationalism in architecture.

Keywords: Bydgoszcz, nationalism, architecture, interwar, functionalism

Vegetation and 'Biophilia' from architectural design

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Human-Nature relationship

The relevance of this subject began with the precedent of postmodern thought in relation to the approach to place and nature. Frequently in the process of designing spaces, incorporating vegetation is not considered as a main or essential element, and less often any analysis or diagnosis of the natural resources of the site is done. This is a product of the evolution of thought about the human being and his relation with nature that has been changing throughout time, resulting in the contemporary approaches, which, as Raimund Abraham describes, seek to conquer the site (Nesbitt, 1996, p. 48). In the Enlightenment, there was a struggle against threatening nature, then in the Industrial Revolution, technological advances allowed its conquest and the modern approach, which took the machine as a model, led to a global environmental crisis that brought postmodern man to rethink his relationship with nature and place (Nesbitt, 1996).

Michael Laurie refers to Erwin A. Gutkind, who encompasses the change in man's attitude towards environment in three phases. The first phase[1] is characterized by fear of the hidden forces of nature, the second phase[2] by an

[1] Within the tradition me-you, characterized by fear of the hidden forces of nature, along with a desire for security. This is the most widespread model in primitive societies, which formed self-sufficient groups with housing and agriculture, where the individual recognized the need for cooperation to survival. The relationship of primitive societies with landscape in which they work and live is direct… (Laurie, 1983, p. 13).

[2] Human accepts the challenge of nature as a discipline, therefore, the me-you relationship is preserved. In this stage people operate with nature on the basis of capturing its processes and knowing their limitations when manipulating them. The landscape is seen as a medium and is known that the continuity of annual harvests production depends on fertilization and good government of the fields... Within this type the medieval towns with their church, their castle and a complex road network were intimately linked to the physiographic characteristics of the place (Laurie, 1983).

increase in confidence, with a more rational adaptation to the environment, and the third phase[3], the present one, with technological societies in a posture of aggression and conquest towards nature (Laurie, 1983, p. 13).

Place

We must also mention the tendency of human beings towards the development of scientific thought, which is the basis for modern science and contemporary academic research, as it has degraded concepts and knowledge fundamental to the understanding of place and landscape in ancient cultures, like the Roman *"genius loci"*, which Western civilization is influenced by. It is also present in other cultures with different names like *"shan"* and *"shui"* (mountains and water) (Moore et al., 1988) of oriental civilizations, whose old masters sought to understand the place in order to find harmony and complete the cycle of the forms of water and earth *"yin-yang"* (Moore et al., 1988). Now in our contemporary society the search for harmony through the understanding of the character of place is forgotten because of the eagerness to abstract and measure data from the complexity, believing that science and technology have released human beings from their dependence on place (Norberg-Schulz, 1976), causing the loss of affinity to place and therefore environmental degradation in the absence of genuine interest and sense of belonging.

The human being's relationship with the natural space, the environment, is dual and auto-constructive, since the human influences the environment by modifying and adapting it to his needs, but often forgets that this is reciprocal, since the human beings themselves live and experience the space they inhabit, which influences their perception, therefore giving meaning to material things and places, an unmistakable manifestation of the symbolic character and undeniable proof of the 'spirit of place'.

Education

This knowledge, present in ancient cultures, has been gradually displaced in contemporary architecture education, which has gradually concentrated on technical and administrative areas, with both academic and professional proposals that focus on a particular aspect of the discipline, forgetting the integral

[3] Adaptation to the environment, characteristic of the second stage has been replaced by the exploitation and consumption of natural resources. Me-that relationship could be symbolized by the urban expansion of our days, oriented by the automobile, with a hinterland offering forests of logged trees, exhausted mining operations and polluted rivers... that is the result of a depersonalization of nature through scientific specialization that, since the nineteenth century, weakened the integrity of knowledge on the link between human and nature (Laurie, 1983).

formation of architects, especially in the environmental-philosophical field while the scientific or technical field is still important. This approach, coupled with the emphasis on the sense of sight, as exclusive for architectural practice (Pallasmaa, 2014), causes contemporary spaces to have poor habitability conditions and, at the same time, does not respect their environment, as there is no approach in the basic academic training of the architect to recover, rescue and respect the relationship between human beings and nature, which, in professional practice, inevitably leads to designing spaces that alienate the human being and degrade nature.

Pallasmaa argues that contemporary architecture creates spaces that alienate us, linking it to the fact that these spaces are primarily focused on the Aristotelian sense of sight, and relegate us as mere observers, depriving us of the possibility to contemplate, due to the emptiness and lack of meaning for which they are characterized, in severe contrast to natural settings that provoke strong emotional bonds (Pallasmaa, 2014).

Environmental movement

Nesbitt retrieves from Norberg-Schulz that the functionalist approach guided humanity to a schematic and characterless environment, without sufficient possibilities for human beings to inhabit it (Nesbitt, 1996, p. 32). A growing concern began to emerge that gave birth to the environmental movement.

The environmental movement was formally established in the second half of the twentieth century[4], gaining strength and becoming a new paradigm not only for architecture, but for humanity. In the early 1990s the Union of Concerned Scientists, with the participation of the most renowned scientists and Nobel laureates from 69 countries, expressed the need to change the course of our practices in the coming decades: "If not checked many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms and may so alter the living world that it will be unable to sustain life in the manner we know" (McLennan, 2004, p. 26).

Since the first decade of the 21st century, the tendency of the environmental movement has continued to grow and intensify[5], becoming a global trend. In the coming decades, the sustainability paradigm (Reed et al., 2009) and its relationship with design will be vital for modifying practices and breaking down the barriers that deprive us of a sustainable world, with a movement that shows

[4] "While the environmental movement had its first beginnings at around the turn of the nineteenth century, it was not until the second half of the twentieth century that the modern environmental movement emerged. The rise of the modern environmental movement came with the realization that we must change our ways, not merely for the vague concept of saving the earth but for saving our own species!" (McLennan, 2004, p. 25).

[5] "The movement is quickly approaching maturity in terms of how it describes itself and by the work of its leading practitioners." (McLennan, 2004, p. 33).

signs of success only in its global recognition[6]. While awareness has grown in a more conscious society, there is no real progress towards an affordable solution.

Recognition of sustainability as a contemporary paradigm brings into discussion the relevance of design and architecture in relation to preserving the environment, as well as the conservation of our planet and species. Sym Van Der Ryn describes the environmental crisis as a design crisis[7], and therefore design itself is one of the bastions from which solutions can be proposed to connect the collective effort joint with other disciplines that seek to reverse the environmental crisis.

Environmental ethics

Environmental ethics seeks a less aggressive relationship with nature and supports the phenomenological idea that is essential for the realization of the human being[8]. David Suzuki summarizes the cause of the environmental crisis as the approach to current problems with past century's ideologies[9]. New problems require new thinking approaches, and William McDonough invites us to formulate new perspectives to address architectural design, taking environmental ethics into consideration[10].

McDonough emphasizes the importance of recognizing rights for future generations of human beings[11]. It is transcendent to be able to offer them a dignified home and in our work as architects, as humans we must be aware that our planet is the only home we have and nature plays a key role in improving current design practices that allow for dignified environments and spaces, enhancing living conditions both in the intimacy of interior space, as well as the exterior space where our societies coexist on an urban scale.

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[6] "In this decade, many are now going Green, because they see economic rather than moral reasons to do so. This is the mark of success for the movement." (Reed et al., 2009, p. 34).

[7] "In many ways, the environmental crisis is a design crisis. It is a consequence of how things are made, buildings are constructed, and landscapes are used. Design manifests culture, and culture rests firmly on the foundation of what we believe to be true about the world." (McLennan, 2004, p. 5).

[8] "a relationship with nature is essential to full human self-realization on this planet" (Nesbitt, 1996, p. 62).

[9] "One reason we are in so much trouble is that our modern culture is paradoxically behind the times, still assessing the world the way it did in the nineteenth or even eighteenth centuries: as a place of inexhaustible resources, where man is at the pinnacle of creation, separate from and more important than anything around him." (McLennan, 2004, p. 9).

[10] "The understanding that nature is not immutable requires an attitude of integration with and a commitment to renewing and restoring the earth and its living systems." (Nesbitt, 1996, p. 62).

[11] "the ethical implications of architectural work include acknowledging the rights of future generations and other species to a health environment" (Nesbitt, 1996).

Architectural design

The major aim of "green buildings", sustainable design, bioclimatic architecture and sustainable building certifications is the reduction of environmental impact, compared to their traditional analogues, while aims such as biomimicry focus on imitating nature, with no clear connection to the idea of reconciling the human-nature relationship and profoundly integrate it into the architectural design. Regardless of having the most sophisticated technological advances, spaces remain sterile, culturally and ecologically disconnecting people, and losing their affinity with place (Kellert, Finnegan, 2011)[12]. As a result, the proposed approaches will produce millions of designs, focused on reduction or imitation, but despite the minimal impact, the problem still remains unsolved, thus making it undeniable that the current sustainable solutions need to be complemented with new perspectives[13]. It should be noted that the intention is not to show design as the only solution that resolves the entire environmental crisis, but rather to understand it as one of the pieces of the equation, which in conjunction with many other disciplines, individual and collective endeavors raise consciousness and complement all the work accomplished in order to address the environmental crisis, which is complex, dynamic and multifactorial.

McDonough believes that "the continuation of the current habits of architectural practice… is negligent" (Nesbitt, 1996, p. 62) and is not solely the fault of the builder, since the basis for the buildings are established from the design, meaning that design plays an important role in the problem.

Through architectural design, it is possible to contribute towards generating strategies, approaches and knowledge that reconsider the relationship between human beings and nature to address the issue of sustainability. Particularly by understanding the place and human relationship with nature, architects can assume responsibility in understanding their practice as a framework for a spiritual apprehension and reconcile this relationship[14].

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[12] "Even though the main point behind green building is to reduce environmental impact, and have less of a burden on the environment, there hasn't been enough of an explicit sort of a connection with the idea of making sure that life and nature itself is brought into architecture into the design, and there certainly have been a lot of projects that are called green and perhaps use less energy and water than their traditional counterparts, but they still are very sterile environments, so they still don't allow people to reach their fullest potential", Jason McLennan, founder of Living Building Challenge in Kellert, Finnegan, 2011.

[13] "Once all these technologies are added and the building is constructed, we have a successful green building that does less damage to the environment… But where does that leave us? If you have a planet filled with millions and millions of buildings that do less damage, you still have not solved the problem… we need to do better than just slowing our way down our collision course." (Reed, 2009, p. 12).

[14] "There is another way in which contemporary architects and landscape architects establish a responsible relationship with nature: their work provides a frame for

One of the most recent proposals is based on the relationship with nature and proposes an innovative design approach called Biophilic Design, which has been reconsidered and simplified in recent years. The difference between previous proposals is mentioned by Judith Heerwagen, who recognizes that sustainability is about the impact of human beings and their behavior on the natural environment, while biophilia is about the impact of nature on human beings[15] (Kellert, Finnegan, 2011).

Restoring the relationship with nature and its benefits is perhaps the reason why biophilic design approach is increasingly used by companies and businesses interested in enhancing well-being for their inhabitants[16].

Biophilic design

The term *"biophilia"* was first used by Eric Fromm in 1973 and was popularized by Edward Wilson in 1984. It was not until 2004, however, that the hypothesis of using biophilia in the built environment was proposed by Stephen Kellert (Browning et al., 2014).

The etymology of "*biophilia*" is formed by the combination of "*bio*" which means alive or living and "*philia*" which refers to the attraction, and positive emotions that people feel towards certain spaces, actions and living beings in the natural environment (Sevinç Kayıhan et al., 2018, p. 2). Biophilia is the innate tendency of the human being to focus on natural life and its processes (Wilson, 1984, p. 1), it is also the emotional affiliation of the human being towards other living organisms, or the affinity that the human being has for other forms of life, evoked, according to the circumstances by pleasure, by the feeling of security, amazement or even fascination-repulsion (Wilson, 1984).

There are different proposals to address the definition of nature and to what constitutes the natural, the wild, or the beautiful, but there are two major connotations. The first conceives nature as everything classified as a living

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its spiritual apprehension, considered fundamental to a meaningful existence" (Nesbitt, 1996, p. 30).

[15] "If you look at sustainability it really is what impact does people and their behaviors have on natural environment and biophilia turns that out and says what impact does nature have on us", Judith Heerwagen Office of Federal High-Performance Buildings USGSA (Kellert, Finnegan, 2011).

[16] "Many global companies are starting to incorporate biophilic design. They've picked up on studies such as the one from the University of Michigan that show that there is a 20% increase in productivity after people spend one hour in nature… Amazon sees the value their spheres at the new headquarters in Seattle are not merely a Statement, they're specifically there so their employees can be immersed in nature and return to their desks refreshed and more productive. Google is implementing biophilic design guidelines, and Etsy's incorporated biophilic design into their headquarters in Brooklyn New York." (Sturgeon, 2019).

organism, unaffected by the anthropogenic impact, which in our era is increasingly scarce. The second conception encompasses everything within nature, even designed by man. The middle point is proposed by William Browning with a view to understanding nature as living organisms and non-living components of an ecosystem (Browning et al., 2014).

Biophilic design is defined as the design for people, conceived as biological organisms, and respecting their mind-body system as an indicator of health and well-being in the context of being appropriate and responsive. Good biophilic design is based on influential perspectives to create inspiring, restorative, healthy and integrated spaces with the place and ecosystem to which they belong, but overall cultivate a love for the place (Browning et al., 2014). Another definition is proposed by Stephen Kellert, who understands biophilic design as buildings and landscapes that enhance the physical and mental well-being of humans by fostering positive connections between people and nature in ecologically and culturally significant places (Kellert, 2013). Furthermore, Kellert notes that biophilic design is aimed at creating habitats that meet people's need for contact with nature within their current built environment (Kellert, Finnegan, 2011).

There are two most relevant approaches within the biophilia to address design problems: one corresponds to the simplification of the six original dimensions proposed by Kellert, who together with Calabrese condenses them into direct experience of nature[17], indirect experience of nature[18] and experience of space and place[19]. The second categorization was proposed by William Browning, who identified fourteen design patterns within three categories, nature in space[20],

[17] "Direct experience of nature is based on the building design that directly makes use of the natural elements such as light, air, water, plants, animals, weather, natural landscapes and ecosystems and fire." (Sevinç Kayıhan et al., 2018).

[18] "The indirect experience of the nature, and attribution to the natural elements are emphasized in the design. The image of nature, natural materials, natural colors, simulating natural light and air, naturalistic shapes and forms, evoking nature, information richness, age, change and the patina of time, natural geometries and biomimicry are the main methods." (Sevinç Kayıhan et al., 2018).

[19] "The components of the criterion refer to the natural connections of space, sense of place and natural connotations. Prospect-refuge, organized complexity, integration of parts to wholes, transitional spaces, mobility and wayfinding and cultural and ecological attachment to the place make reference to the natural settings that the humans are accustomed to." (Sevinç Kayıhan et al., 2018).

[20] "Nature in the Space addresses the direct, physical and ephemeral presence of nature in a space or place…The strongest Nature in the Space experiences are achieved through the creation of meaningful, direct connections with these natural elements, particularly through diversity, movement, and multi-sensory interactions. Nature in the space encompasses seven biophilic design patterns: 1. visual connection with nature, 2. non-visual connection with nature, 3. non-rhythmic sensory stimuli, 4. thermal & airflow variability, 5. presence of water, 6. dynamic & diffuse light, 7. connection with natural systems." (Browning et al., 2014, p. 9).

natural analogues[21] and nature of space[22]. Both classifications seek to propose a set of criteria, where the principal categories describe very similar elements, although expressed in distinct terms (Sevinç Kayıhan et al., 2018, p. 4).

One central component of the proposal is vegetation as a natural element that can often be associated, because of the tendency towards reduction in design approaches, with the need to subtract carbon dioxide and provide oxygen. However it is necessary to know the natural capacities of vegetation to perform photosynthesis and not confuse the incorporation of vegetation in architecture with a feasible solution.

Vegetation has oxygen replenishment qualities, but to efficiently respond to carbon dioxide emissions from contemporary cities, vast extensions of fields or forests would be required, which is why the scarcity of trees in cities is primarily addressed by their microclimatic function (Laurie, 1983, p. 241–242). It is not viable to incorporate vast extensions of vegetation in contemporary metropolises as the same artificial landscape elements (anthropogenic) cover the majority of urban space, reducing the possibility of improving the oxygen supply in cities photosynthetically.

Despite the fact that vegetation is only useful in extensive quantities to have some kind of impact on the environmental crisis, the biophilic design proposal returns to the fact that all people have a close connection with nature, a primordial link from which our need to be in contact with it emerges (Browning et al., 2014). When people develop in natural environments, it is possible to recognize effects in three systems of human beings, the cognitive[23], the psychological[24] and the physiological[25] (Browning et al., 2014). There is evidence that verifies, in varying degrees, the impact of environment on human well-being, which is generally associated with positive influence on health and mood, a feeling of calm and tranquility that evokes our primal instincts to reconnect with nature (Beatley et al., 2018).

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[21] "Natural Analogues addresses organic, non-living and indirect evocations of nature… The strongest Natural Analogue experiences are achieved by providing information richness in an organized and sometimes evolving manner. Natural Analogues encompasses three patterns of biophilic design: 8. biomorphic forms & patterns, 9. material connection with nature, 10. complexity & order." (Browning et al., 2014, p. 14).

[22] "Nature of the Space addresses spatial configurations in nature… The strongest Nature of the Space experiences are achieved through the creation of deliberate and engaging spatial configurations commingles with patterns of Nature in the Space and Natural Analogues. Nature of the Space encompasses four biophilic design patterns: 11. prospect, 12. refuge, 13. mystery, 14. risk / peril." (Browning et al., 2014, p. 10).

[23] "Cognitive functioning encompasses our mental agility and memory, and our ability to think, learn and output either logically or creatively." (Browning et al., 2014, p. 11).

[24] "Psychological responses encompass our adaptability, alertness, attention, concentration, and emotion and mood." (Browning et al., 2014).

[25] "Physiological responses encompass our aural, musculoskeletal, respiratory, circadian systems and overall physical comfort." (Browning et al., 2014).

The role played by the psychological component during the design of a space is vital, as Serra mentions, "Human responses to environmental parameters, whether from comfort or from perception and aesthetics, are dependent on the psychology of people using the environment" (Serra, 2004, p. 18). Serra also highlights the importance of not only natural elements, but also of maintaining a connection with the exterior, evident in contemporary preferences for "architecture without walls" and the use of glass as a preferred building envelope[26].

Environmental psychology

The discipline that studies environment and human behavior is environmental psychology; it focuses on the relationship of the individual with the environment through perception, learning and cognition. The field is linked to the environmental response mentioned above, from the mid-20th century due to the growing concern about the environmental deterioration caused by human habits. From its beginnings it has tended to the study for measuring the behavior of the individual towards the environment quantitatively or qualitatively. As such the biophilia is a recurrent subject in environmental psychology researches, as a phenomenon being related to the identification studied subjects have with natural environments, suggesting a connection at an unconscious level with nature (De la Garza Gonzaleaz, Lopez Ramirez, 2010) and reinforcing Wilson's proposal as a biological need of human beings to relate with Nature (Wilson, 1984).

In environmental psychology, research has associated the reduction of stress with human beings in "natural" environments, primarily identifying two types of attention: the voluntary and the involuntary, which is related to the character of fascination with nature (Leandro Rojas, 2011). The second concept is related to the restorative character of spaces on individuals who experience them. This is where studies as the ones by Ulrich (Kellert, 2013), Sánchez-Miranda (2016) and Heerwagen (1998) focus on, demonstrating the positive effects of natural elements on the perception of individuals either in their medical recovery or in their productivity in work environments. For most of these studies environmental stress is the main subject.

Also, an association can be found between satisfaction and the presence of nature; through the analysis of photographs taken in various countries, it was concluded that human beings tend to be in natural environments that

[26] Yet there is still another hidden reason behind the modern claim of architecture without walls, which is the communication of the interior with the exterior, or rather, a certain need to eliminate the separation with nature. Obviously, this happens on a collective psychological level, in a society that dominates the natural environment, it no longer results unpleasant and we even idealize it and turn it into a landscape, the wider and more connected to us, the better. For further information consult R. Serra (2004).

function as a framework for many of their positive experiences[27]. Other studies show that places with a strong connection to the natural environment have positive effects on psychology. Roger Ulrich concludes that experiencing nature can have psychological and even physiological effects on health; his findings show that patients would spend less time in hospital if they could look at nature, which also reduces pain, lowers consumption of narcotics, and improves mood[28]. Judith Heerwagen talks about an increase in productivity and perception of well-being in the employees of Herman Miller Greenhouse working in their new office building, which is based on the biophilic design (Heerwagen, 1998).

Comfort

Environmental comfort depends on the combination of comfort parameters[29], general parameters[30] and comfort factors[31] identified by Rafael Serra, which can be intervened. It is recognized that natural elements influence the well-being of the people who inhabit space[32] and there are two levels of intervention in space,

[27] "…by coupling social media and artificial intelligence using 31,534 social media photographs across 185 countries… nature was more likely to appear in photographs taken during a fun activity, honeymoon, or a vacation compared to photographs of daily routines. More importantly, the proportion of photographs with nature taken during fun activities is associated national life satisfaction scores. This study provides global evidence of the biophilia hypothesis by showing a connection between humans and nature that contributes to life satisfaction and highlights how nature serves as background to many of our positive memories." (Chang et al., 2020).

[28] "Experiencing nature might be calming or in some way psychologically or even physiologically healthful". Roger Ulrich Professor, Texas A&M, conducted a study on bladder surgery patients, who spend a lot of time captive in one setting, concluding that they may have detectable or measurable health consequences. The demographic characteristics of the patients were similar and they were randomly assigned to a room, the surgery rooms were identical, with the exception of having a view of a brick wall or outside trees. A number of factors in addition to the views were controlled to assess whether this affected recovery. For all of the variables that were controlled, people spent less time in the hospital if they had a view of nature; they also showed less pain, low narcotic consumption and better mood, compared to patients without the view to nature (Kellert, 2013).

[29] Environmental or comfort parameters are those objective characteristics of a given space, which can be evaluated in energy terms and which summarize the actions that, in such space, are received by those who occupy it... such parameters are specific to each direction... they can be calculated with physical units (Serra, 2004, p. 13).

[30] The general parameters affect all the senses at once, such as the dimensions of space... the time factor with the changes that may occur, etc. (Serra, 2004, p. 13).

[31] Comfort factors ... are those characteristics that correspond to the users of the space... These personal conditions will be of different types, depending on the conditions: biological-physiological, sociological and psychological (Serra, 2004, p. 13).

[32] Natural elements become part of architecture to fulfill a double role, on one hand defense and physical well-being of its occupants, on the other hand, affirmation of

the first working with comfort parameters, i.e. thermal, acoustic, visual, etc. and the second level with perceptive and aesthetic terms, i.e. comfort factors.

Therefore, psychological components influence human responses to spaces, while architects and designers can influence the comfort of these spaces, considering that comfort is multifactorial and dynamic, so the same response will not always be produced[33]. Through design it is possible to act on the environmental parameters[34], which influence comfort, and one of its components is the psychological aspect in the perception of space.

Nature is a fundamental part in the creation of spaces that provide comfort to its inhabitants. By exploring new approaches, the existing ones that address the environmental crisis can be complemented[35].

Contribution?

Biophilic design complements current design approaches by having a focus on environmental psychology, which emphasizes how nature affects humans, as opposed to the frequent proposal of how humans impact nature typical in contemporary architectural design. The proposal bases its theory on rescuing the connection between human beings and nature (Browning, Clancy, 2014), and by incorporating patterns into the design through materials, shapes and elements, it directly affects the comfort of the space, being its value in promoting positive psychological, physiological and cognitive effects, such as the perception of decreased environmental stress, which most recent research focuses on. The shift in direction and identification of possible benefits of nature in humans leads to the question: is biophilic design the significant contribution missing in architectural design theory and practice to contribute towards the paradigm of sustainability?

Beyond the effects of biophilic design on human systems, a much more important value lies in the change of mentality. Undoubtedly there is a strong contemporary discourse around environmental sustainability, so there is

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ownership, characterization and marking in the territory, that is, psychological well-being for these same occupants (Serra, 2004, p. 74).

[33] In this way we will be able to act on the comfort of the space's occupants, but without ever pretending to obtain guaranteed results. The interaction between different parameters, the impact of the various factors of the user, the influence of psychological factors, variability and, above all, the possibility of action and control of these parameters by the user himself, are decisive in the final result (Serra, 2004, p. 19).

[34] The final consequence of all the considerations that can be made about well-being is that, in any architectural space, it is possible to act, from the beginning of the design, on the environmental parameters that will result in the building (Serra, 2004).

[35] "It is great to see the trend of getting plants and green walls into our buildings, but to really connect people and nature we're going to need a lot more than this, we're going to need a concept called biophilic design, which translates literally to 'love of life'." (Sturgeon, 2019).

a recognition of the importance of nature and even an environmental awareness, but acknowledging an innate connection of the human being with nature and placing it at the heart of design can bring a profound reflection on the anthropocentric conception of the world and the loss of affinity to the place that characterizes our contemporary societies. The respect of the human-nature relationship, the connection with that love of life, was present in our ancestral societies and today lies buried under the practices of the ever increasing demography and vertiginous urbanization of the planet.

The most relevant contribution of biophilic design is to be found in the discourse on the importance of nature for the inhabitants' well-being, supported by the effects on their health. The dialogue that allows this design proposal assumes that human beings revalue their relationship with nature and promote scenarios of deep reflection understanding that there is no single solution. It requires joint interdisciplinary and collective efforts, perhaps the biophilic design is not the final significant contribution, but it is the basis idea about the importance of the human-nature relationship, a crucial point where various disciplines can depart to converge on approaches that contribute to the paradigm of sustainability.

Conclusion

Unsustainable contemporary urbanization requires a return to the origin of concepts such as the relationship with nature present in ancient societies, not only relevant to architects and urban planners, but also fundamental for various disciplines since construction, architecture and current urbanization are no longer elaborated by a professional or an independent discipline, but by interdisciplinary collaboration between multiple teams of specialists, all of whom have influence on the outcome of the interventions; if a common base for fundamental concepts were to be used, it is likely that the approaches would recover values such as the importance of the 'spirit of place' and would attempt to find the harmony desired by ancient cultures in the relationship of man with nature and place.

To radically change the current focus of developing projects would be to aim at a dreamlike approximation, unfeasible and therefore not transcendent. It is necessary to generate awareness in design professionals so that by incorporating new approaches, such as biophilic design theory, the importance of promoting designs that do not only take into consideration natural elements and incorporate vegetation, but also recognize the value of the relationship between human beings and nature to propose it as a central element in the design is recognized.

The discourse of biophilic design considers nature important for the well-being of the inhabitant, supported by the positive effects on human systems, but the relevance lies in the aperture of the dialogue towards a profound

reflection on our contemporary societies and their relationship with nature. It is important to reconsider the relationship that can reconcile affinity with the place, generating consciousness in people and making them interested in preserving and maintaining buildings and cities and, what is even more important, nature.

As architects we must recognize that we have a role in part of the sustainability paradigm; there is an ethical duty that promotes consciousness and the feeling of responsibility to contribute from the trenches of our discipline in the joint effort that triggers a change in mentality, and remember as humans the transcendence of recovering the relationship between societies and nature, not only for future generations, but also for all living beings with whom we coexist.

Bibliography

Beatley, T., Jones, C., & Rainey, R. (2018). *Healthy Environments, Healing Spaces: Practices and Directions in Health, Planning, and Design*. Charlottesville: University of Virginia Press.

Browning, W., Ryan, C., & Clancy, J. (2014). *14 Patterns of Biophilic Design. Improving Health & Well-Being in the Built Environment*. New York: Terrapin Bright Green.

Cabeza, A. (1993). *Elementos para el Diseño de Paisaje. Naturales, artifi ciales y adicionales*. México, D.F.: Trillas.

Chang, C.-C., Yi Cheng, G.J., Nghiem, T.P., Song, X.P., Ying Oh, R.R., Richards, D.R., & Carrasco, L.R. (5 de 3 de 2020). Nature. Retrieved from Scientific Reports: https://doi.org/10.1038/s41598-020-60902-w.

De la Garza Gonzaleaz, A., Lopez Ramirez, E.O. (2010). Un estudio de mediciones de actitudes implícitas hacia al medio ambiente en estudiantes de biología y psicología: ¿Biofilia? *Revista Psicología Científica*.

Heerwagen, J.H. (1998). Design, Productivity and Well Being: What are the Links?. Paper presented at The American Institute of Architects Conference on Highly Effective Facilities Cincinnati, Ohio March 12–14, 1998. Retrieved from: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.467.8729&rep=rep1&type=pdf (access: 27.04.2021).

Kellert, S. (18 de 10 de 2013). Brightright: People and Nature in the Modern City. Retrieved from Artstor: https://library.artstor.org/public/UVA_FISKE__1067_15161853.

Kellert, S., & Finnegan, B. (Productores). (2011). Biophilic Design: The Architecture of Life [Movie].

Laurie, M. (1983). *Introducción a la arquitectura del paisaje*. Barcelona: Gustavo Gili.

Leandro Rojas, M. (2011). *Ambiente, conducta y sostenibilidad: estado de la cuestión sobre el tema de psicología ambiental*. San José Costa Rica: Instituto de Investigaciones Psicológicas, Universidad de Costa Rica.

McLennan, J. (2004). *The Philosophy of Sustainable Design. The Future of Architecture*. Canada: Ecotone.

Moore, C., Mitchell, W., & Turnbull, W. (1988). *The Poeticas of Gardens*. Cambridge, United States of America: M.I.T. Press.

Nesbitt, K. (1996). *Theorizing A New Agenda For Architecture. An Anthology of Architectural Theory 1965–1995*. New York: Princeton Architectural Press.

Norberg-Schulz, C. (1976). The Phenomenon of Place. *United States of America: Architectural Association Quarterly*, 8, 4.

Pallasmaa, J. (2014). Space, place and atmosphere. Emotions and peripherical perception in architectural experience. *Lebenswelt: aesthetics and philosophy of experience* 4. DOI: https://doi.org/10.13130/2240-9599/4202.

Reed, B., Boecker, J., Horst, S., Keiter, T., Lau, A., Sheffer, M., & Toevs, B. (2009). *The Integrative Design Guide to Green Building. Redefining the Practice of Sustainability*. Hoboken: John Wiley & Sons, Inc.

Riley, K. (13 de Marzo de 2020). Why Biophilic Design Is Good For You: And "Bio" Terminologies Defined. Retrieved from Medium: https://medium.com/@KaseyLaineRiley/why-biophilic-design-is-good-for-you-and-bio-terminologies-defined-a2f4bdd73284.

Sanchez-Miranda, M. (2016). La capacidad restaurativa de la naturaleza: En la búsqueda de su relación con las actitudes implícitas. *Opción*, 36, 13, 840-863.

Serra, R. (2004). *Arquitectura y Climas*. Barcelona: Gustavo Gili.

Sevinç Kayıhan, K., Ozcelik Guney, S., & Unal, F.C. (1 de 2018). Biophilia as the Main Design Question in the Architectural Design Studio Teaching. Retrieved from MEGARON: Yildiz Technical University, Faculty of Architectural E-Journal. 13: https://www.researchgate.net/publication/322185297_Biophilia_as_the_Main_Design_Question_in_the_Architectural_Design_Studio_Teaching.

Sturgeon, A. (6 de 2 de 2019). Using Biophilic Design to heal body, mind, and soul. Retrieved from TEDMED: https://www.tedmed.com/talks/show?id=729937.

Wilson, E. (1984). *Biophilia*. Cambridge: Harvard University Press.

Wolch, J. (17 de 10 de 2013). Biophilic Cities Manifesto. Retrieved from Artstor: https://library.artstor.org/asset/UVA_FISKE__1067_15162074.

Abstract

Vegetation and 'Biophilia' from architectural design

At present, buildings and cities have become places that cause extensive environmental damage and constantly move away from their connection to nature. Sustainable design approaches focus on reduction, that is, on minimizing, mitigating, and avoiding negative effects on natural ecosystems. It is not enough to really ensure lasting sustainability in buildings and cities that promote health and well-being for their inhabitants. Human thinking about nature has been changing over time, acknowledging mainly three phaseswhere nature shifts from being the feared and dominant force, to a more balanced phase of adaptation to the environment and finally to the conquest by technological and industrial advances of our societies, constituting the basis for the ongoing environmental crisis. The need to rethink this idea as an alternative that contributes to the paradigm of sustainability and to reappraise the importance of the relationship between human beings and nature in architectural design has been raised. It is not intended to understand design as a final resolution instrument, but as part of the complex network that together with interdisciplinary and collective efforts can address one of the current paradigms of human beings. This article makes a brief compilation of the evolution of the human-nature relationship and introduces biophilia as a contemporary design approach, thereby introducing the question of its contribution to the paradigm of sustainability.

Keywords: Biophilia, nature, vegetation, architectural design, sustainability, human-nature relationship

The appropriation of public space in the Gasca community. A battered star

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Every event or human group is shown in a "here and now" dimension, so if you want to understand it, it is necessary to immerse yourself in that being. Therefore, it is worth starting by showing the town of Gasca in its spatial insertion, as well as in the time of its appearance. It is located in the municipality of Celaya, Guanajuato, in central Mexico.

Although the town had already existed for a long time under its current name, it grew in the 1960s, under political decisions taken by the federation and also under the private interests of an agricultural company. By presidential mandate, the homestead was moved from its original location to another specially designed for it. Its urban layout is based on four stars, originally thought to be a "type" community where community life could be promoted inside it (Figure 1).

At the time, it was most likely considered that "... urbanization led to social progress and the advancement of humanity" (Olivares Díaz, 2016, p. 96). From this position, the urban style should be understood as the articulating axis of the implementation of development, this being the synthesis of the impulse of progress and civilization. There is no other community in the region with a similar urban layout. However, all this developing effort remained in intention. After the inauguration of the community, it was forgotten by the federal, state and municipal authorities; the urban layout by itself was neither going nor generating modernity or any development. This modern and urban vision totally ignored the rural world and all its complexity.

Despite the abandonment by the authorities and the insertion of the community to a design not built by them, the community appropriated the new territory as a *locus*, symbolizing it, signifying it, marking it, geographing it (Olivares Díaz, 2016, p. 113). The human group was reconstructed from those "stars" showing that the rural is a complexity far from a simple contradiction. What was designed from the urban concept was then ruralized, crystallizing almost from the beginning the manners lived in the field. The square in the center of each star acquires its own identity and that of the center, the most important for its people, becomes its articulating knot. This one represents the Sun's Square.

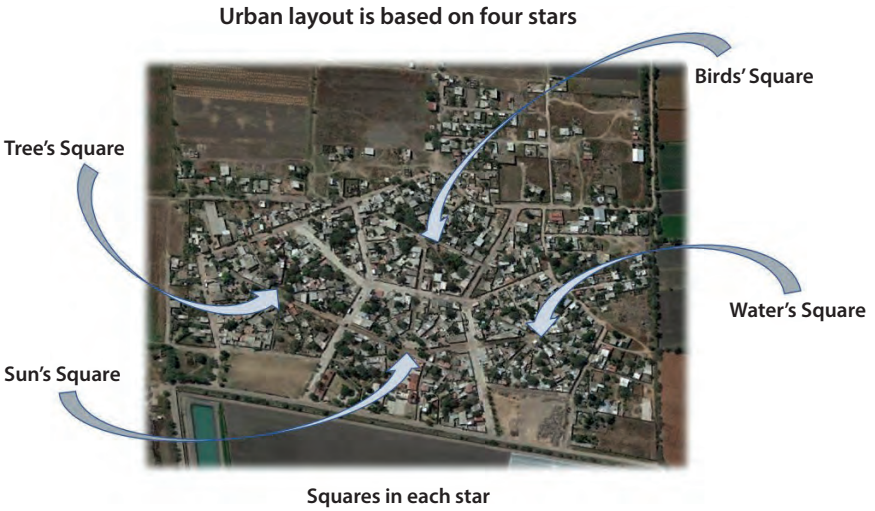


Figure 1. Urban layout

However, the capitalist economic system has separated peasants from their lands, and the employment alternatives to which they can aspire are in plantations or agro-industrial companies. Thus, as Gasca was inserted in this scenario with such poor alternatives for economic and social improvement, most people have been employed in the agribusiness that borders the town. Having been peasants, now they are workers with salaries barely enough to survive. Many more have migrated to the United States or moved and work for other companies in the region. Life in the community is exclusively linked to work; there are currently few options to develop community activities, and access to basic services is very limited, especially if they are cultural or academic activities.

In the past, the cultivation of the land provided consumers with products that were distributed as the result of the collective work, allowing the configuration of a social tissue. Now, under the productive dynamics between the worker and his salary, the past community logic is broken, making a way for competition and accumulation, although this presents itself as more poverty. In addition to this, "... the government's social welfare programs promote self-victimization of people, assuming them as objects of help and not subjects of transformation" (Centro de Investigación y Acción Social para la Paz, 2016, p. 230). In this way, requests for 'help' are continuously heard from whoever they consider to be responsible. That is, any outsider who approaches the town will be the recipient of requests for help in money or in kind. This scenario experienced in Gasca – not being the only one – has been the ideal one for the insertion of illegal drug trafficking and huachicol[1] practices. Bartra (2016b,

[1] The theft and sale of gasoline is nationally called "huachicol".

p. 67) points out: "Capitalism penetrates and corrodes all things – physical and metaphysical – as use values". And as a use value, the population of Gasca lives violence and criminality in their daily lives; nothing is left but the legitimation of crime and with it the dispossession of the hopeful future.

This negative daily life occurs both within families and in public spaces. Those squares that were used and enjoyed by the families until recently have been taken over by groups of young people to consume and exchange drugs or sell huachicol. Little by little, the social tissue of the community has been fracturing, observing itself in a process of fragmentation, where the place to configure or rebuild it has been taken by crime; those sites that allowed social ties that favor the cohesion and reproduction of social life have been stripped of their community mission. The defense of social property, says Bartra, refers to the territories and spaces of the peoples (2016b), whether it is an external one that wants to appropriate them or an internal one that does not allow their communal use.

The community of Gasca has lived through a cyclical process where the beginning can be signaled: the abandonment by the institutions has caused poverty and social marginalization, creating at the same time, the perfect setting for the introduction of criminality. Its presence has fragmented the social tissue, nurturing the deeper insertion of crime. Given this, how is it possible to break that cycle? How to influence the recovery of the enriching community sense of symbols and identities? This will not be possible if it is not understood that violence has cultural and structural causes that must be considered in the analysis and reflection process. In the first place, it is essential to understand that the community is placed – like the entire current society – under a patriarchal system whose order of power is based on the masculine, that is, on man from whom everything else spins (Lagarde y de los Ríos, 2018). Secondly, it is the conception of man that exists in the rural world and, of course, in Gasca: the young man in order to demonstrate his manhood and insertion into the group, must challenge the institutions. Nothing is more challenging than entering organized crime that also shows an image of manhood and male leadership. From a very young age, the men in rural communities are motivated to show their masculinity, many of them directing their actions to challenging and aggressive processes, both for the community and for themselves.

On the other hand, and no less important, there is the role of women. They, in the rural family structure, continue to fulfill the function of subordination; they have not managed to access a more autonomous position or to think by themselves. In the rural world, when a young woman gets married, she goes to live in her husband's home, so her skills and knowledge will become assets of another domestic group, not representing, in this sense, a value or a resource for her domestic group of origin (Arias, 2016, p. 181). Thus, the academic preparation that can be accessed, which in itself is very limited for everyone, will be even more restricted for women. The few opportunities for academic

development will focus on basic education, which is what is available to them. This, together with the conception of 'man', as patriarch and provider, will lead her to think and build herself for him. In Gasca, the vast majority of young women already have one or two children by the age of 18. Given this, Dussel (1990, p. 12), points out, "... how in an oppressive society, women are the first oppressed, and this oppression is much deeper than the man – who is also oppressed – believes, and what the woman believes, being the oppressed of an oppressed". Now, if the space where these young women "are allowed" to live together is taken over by aggressive or criminal groups, the future for them is more bleak; they are left in the confinement with a family that also lives inside that violence.

Adding to the above, the capitalist system is ethnocidal and geocidal (Bartra, 2016a, p. 53). Communal ways of life of rural human groups have been damaged, inserting competition, individualism and structural violence. The school, in this sense, has cooperated in this crisis. Basic education does not collect the knowledge of the site, neither values it, on the contrary, it promotes knowledge that will not significantly provide tools for the labor insertion so that people can access economic and social promotion; it prepares them to compete for a worker position, not for the collaborative work that is required. Academic education continues to be designed from an urban-capitalist perspective and for a population that has other types of spaces and institutions at its disposal. The town of Gasca has only basic education – meaning elementary and junior high school – so if young people want to learn in high school or go to higher education, they have to travel to other communities or to the municipal seat; nothing is further away for the majority and above all, for women. This is the expense they are not able to meet.

In addition to the above, spaces for recreation and sports are basically absent from rural communities, particularly in Gasca. There is no place where art, culture or any other manifestation of integral enrichment can be lived. Their spaces for sports are earthy fields, which pretend to be soccer and baseball fields. These sports are practiced Sunday after Sunday, although at the end of the games, men usually drink alcohol, usually ending in male drunkenness and, in many cases, in fights. This behavioral pattern is perceived as 'natural'. Violence is presented as a male condition (Lagarde y de los Ríos, 2018, p. 91). In most of the interviews carried out among the population, the men indicated that this was the "normal way" and that nothing happened beyond that. They even declared that this was a channel to smooth the rough edges out. On the other hand, women commented that at the end of the match they used to withdraw since they already knew what was coming; they limited themselves to waiting for their boyfriend or husband at home in the conditions that they already knew would arrive: all of this as if "that's how it should be".

In this given environment, how is the violence and criminality observed? Ithas become invisible; it has become naturalized. As it has been argued, both the structural and cultural problem have contributed to ways of life moving in

the illegality and the destruction of the community. The loss of the relationship with the land, access to economic resources via drug trafficking or fuel theft, and rural patriarchal forms, have configured a bleak scenario: all of this materializing in the appropriation of public space, diminishing the community while it damages the family nucleus. It is necessary to recover the voice of the communities in ways that they can build from their complexity. It is necessary to conceive the rural as a space that enables its own and enriched identity processes; spaces from and by their own growth process.

Now, why is so much importance given to public spaces? Because these are occupied, named, signified, governed, cultivated (Bartra, 2016a, p. 62) and by doing so, the community that makes it possible is rebuilt; it is a being that is and exist together with the human group and the site that therefore becomes an anthropological place (Pratz, 2004). These are more than places, they are places that are built as a community and in its everyday life, since they are perceived through the senses, sensations, and day-to-day experience; they represent the values and interpretations of that community existentiality, that is, of the symbolic representations of individuals and their social groups. They are places where community problems are 'healed', where the community is enriched and where the social tissue can be created and manifested. Faced by the abandonment or exclusive use of them, fractures and rupture of the social tissue arise. For this reason, it is a serious problem that in Gasca these spaces are part of criminal groups for carrying out acts of aggression and illegality, threatening the health of the community as a community, preventing it from being in its being[2].

Centro de Investigación y Acción Social por la Paz (2016, p. 227–228) maintains: "In the community festivities, horizontal relationships are lived that favor trust and a culture of care among the participants". In this sense, in the main square of Gasca, that of the Sun, the patron saint festivities are held. When these types of events are promoted, the community experiences them, although not in the same way as before crime became part of its life. The community continues to "fight" for their space, even if it is to celebrate what means so much to them: the place where spirituality becomes sacredness; the knot that ties the religious together with the profane that characterizes community festivals to such big extent. In this context, in the interviews the residents of Gasca affirmed that religious festivals have been one of the meeting spaces that have most helped to improve neighborhood relations. In this sense, not only must the squares in Gasca be recovered, but in such a way as to promote the coexistence of all, strengthen social ties and with it, the solidity of the social tissue. A recovery, not only in the religious sense, but also in the cultural one, encompassing those human needs beyond belief or ideology. Places that, due to this characteristic, also allow family reconciliation, which was also damaged by the violence experienced.

[2] In the original spanish version of the manuscipt it is expressed as *„Estar-siendo"*.

Although the importance of public spaces for shaping the social tissue has been shown, these should be understood as territories where there are relations of management, power, dominance and dispute. They are not neutral or flat spaces in the cultural sense; they are places where community relationships are shown, being a natural characteristic of any geographic space occupied by human societies. Understanding this context, the spaces can be redesigned by the community itself so that from there that power and dominance promotes the consolidation of the participating social group of its own ways of being and seeing itself as such; no longer thinking or assuming themselves in the underworld of illegality, but as a potentially growing community group. With this intention, the ethics of care and responsibility can help to achieve this goal (Centro de Investigación y Acción Social por la Paz, 2016). Taking care for themselves as a community and for their place, which reinstitutes them as a social identity group and belonging to themselves, this **being themselves** for **themselves**.

What is observed then for the Gasca community is that it could visualize itself in another scenario of existence; one where it assumes itself as a builder of a more hopeful future than the one it now lives. As long as it continues to wait for the help of the institutions and naturalize crime and violence, it will have very few options to build a different future and to build a community enriched by itself. In all the interviews carried out, the inhabitants point out the problem of drug addiction in young people and alcoholism in them and adults, but they do not show any problem in having lived from the theft of gasoline (huachicol) and the theft of other products. They do not find the relationship between the two actions, nor in the gender violence that is experienced every day. According to their opinion, the first is something bad but 'insurmountable' and the second, part of its economy, not counting on the ways of observing 'man' and 'woman'. Given this, Bartra (2016b, p. 35) points out: "Humanity entered the 'Emergency Room', so in politics you have to do what you can here and alleviate some of those pains"; those pains are well identified in the community of Gasca.

A great strength in this community are its women. In all cases, they have emerged with great force to promote neighborhood coexistence, either in the patron saint festivities or in actions to recover their public spaces. They are also the ones that have significantly supported government and school programs. Given this, the fundamental question arises: if they are given more academic and cultural tools, how much more can they achieve? For this reason, the recovery of Gasca's squares is proposed to install events and scenarios enriched with community and culture. Each square will recover its identity and objective in such a way as to promote the visit and meeting of the other inhabitants at it. In the Plaza del Sol (Sun square), it is proposed to build the municipal building, a library and a multicultural space where cultural events of different kinds are projected, such as films, theater plays, storytelling, etc.: a whole program of bringing art closer to its space. At the site of the temple,

enable the existing rooms as workshops to give different classes and trainings, promoting self-employment and generation of family businesses. We must work to answer the question that Bartra asked himself: "Are these peoples more dignified, more self-confident, more smiling, happier than they were before? And to be able to answer: Yes.". So we're doing well (Bartra, 2016b, p. 34). It is expected that this star will shine again from itself by itself.

Conclusions

Organized crime has used three things to successfully insert itself into the community: the abandonment of the countryside by the institutions, the aggressive capitalist economic system, and the local ways of perceiving themselves as 'male' and 'female'. The solution to this is far beyond the scope of this investigation. However, this contribution can help to eradicate it: with the reconstruction of the social tissue through the recovery of its public spaces, wishes that have been expressed by the community.

The public space, in this case the squares, are the sites identified as their own, rebuilt on a day-to-day basis, instituting the community in turn and in that daily life. Here is the importance of reappropriation of the space by its people who, as a result, perceived themselves differently from others.

Bibliography

Arias, P. (2016). Entre el grupo doméstico y el trabajo. Otros actores y nuevos límites a la autonomía de los migrantes. In: B. Canabal Cristiani y M. Olivares Días (coord). *Sujetos rurales*. México: Itaca.

Bartra, A. (2016a). Geofagia y arraigo. Despojo y resistencia en los territorios. In: B. Canabal Cristini y M. Olivares Días (coord). *Sujetos rurales*. México: Itaca.

Bartra, A. (2016b). *Hacia un marxismo mundano*. México: Itaca.

Centro de Investigación y Acción Social por la Paz (2016). Reconstrucción del tejido social: Una apuesta por la paz, s/d. Cd. de México.

Dussel, E. (1990). *Liberación de la mujer y erótica latinoamericana*. Colombia: Nueva América.

Lagarde y de los Ríos, M. (2018). Género y feminismo, siglo XXI, Cd. de México.

Olivares Díaz, M.A. (2016). Los sujetos rurales, globalización y contradicciones espaciales. En: B. Canabal Cristiani y M. Olivares Días (coord). *Sujetos rurales*. México: Itaca.

Pratz, L. (2004). *Antropología y patrimonio*. Barcelona: Ariel Antropologia.

Abstract

The appropriation of public space in the Gasca community. A battered star

The community of Gasca is a rural town that has little basic equipment, urbanization and adequate infrastructure, and few opportunities to access well-paid jobs. Under this context, many members of the community have been involved in illicit activities such

as the theft of fuel – locally called “huachicol” – and the drug addiction of the youth, leading to violence inside it and physical deterioration of the public space. These groups are preventing the community from living the public space to reconfigure or conform, thereby causing a weakening of the social tissue and a decrease in community life.

The community is proud of its squares and its patron saint festivities. Given this, its recovery is proposed through its redesign and the incorporation of cultural and recreational activities. Likewise, capacity building workshops for self-employment and generation of family businesses are proposed. Families are expected to reconstitute as a community, helping to reduce violence and drug addiction.

This research was a documentary and field investigation with ethnographic techniques. The research method was the dialectic-criticism. Semi-structured interviews, site readings and documentary reviews were carried out. The main categories that provided the basis for the interviews and site readings were selected. With all this, the interpretations that give substance to the work presented were built.

Keywords: appropriation, public space, community, violence

IV. SUSTAINABILITY, SOCIAL ISSUES, GOVERNANCE

Social and territorial inequality in Colombia

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Introduction

Some theorists and researchers think that social and territorial inequality in some latitudes and particularly in Colombia, tend to be persistent in time and space being explained by what Galvis & Meisel Roca (2010) calls the "neighborhood effect. These effects create poverty traps and spatial traps" since they do not allow social groups and regions to incorporate into the dynamics of sustainable development.

Then, depressed regions with highly unsatisfied basic needs (UBN) cluster, and incipient development environments promote the reproduction of inequities and the formation of movements and social manifestations that demand access to modernity, inclusive development, and full social justice. Ignoring these effects is causing territorial and political governance as well as governability to be at risk.

In this context, this chapter seeks out to show the differences in development between regions within the country based on the reviews of some studies that applied different methodologies, but grouped up the same variables in their indicators and dimensions in a high percentage, to define an index that will lead to the characterization of the territorial entity.

1. Conceptual Framework

Territory as a repository of material and immaterial space, in a punctual and diverse worldview (Escobar, 2012) reports action and consequently becomes dynamic, so the concept of territoriality is relativized and is conceived as a spatial functionality resulting from the dynamic construction of systemic networks, which (Muñoz Velasco, 2018) define and characterize as a social and historical product given a natural endowment, social relations of production, presence of institutions that outline it and cohesion to its integrating elements

(Pnud, 2011) in an endogenous use of resources and their potentialities, as a condition to improve people's quality of life in local and regional development (Silva Lira, 2005).

However, such conceptualization is only possible under the construction of innovative and competitive territories, where the transformative action of the productive processes is accompanied by "companies of the territory" (86), and not, companies that use the territory to develop an activity in detriment of local assets. Then, this categorical imperative allows not only to enhance the triad (interactive relationship): Company-Society-State, but also governance and territorial governance taking on validity and importance in terms of a strategical and dimensional framework for sustainable development, which by the way, must be regarded as human (Rendon Acevedo, 2007) and supported by the concept of human capabilities (Sen, 1998), complemented by the approach (Nussbaum, 2002) concerning the enhancement of people's opportunities to make use of their self-determination for a better life.

All the nonconformity of social groups in the world at the dawn of the 21st century is characterized by problems of multicultural and diverse populations that these groups may find within their states, discrimination and exclusion from the circuits of accumulation and progress, the sheer presence of inequities and injustices under a savage and resource-consuming capitalism, demand – beyond borders – for the recognition in the public sphere as Honneth (1997), Taylor (2003), Rawls (1971), Fraser, Honneth (2006) have pointed out. They cry out in a more interconnected world communicated by solidarity and conceptual identity, centered on a better socio-economic distribution and legal and cultural recognition (Fraser, 2008).

Then it is here where the agenda proposed to the world by the United Nations Organization for 2030 (United Nations Development Programme, 2018), built on the need to strengthen values and ethical foundations through a great programmatic agreement between nationalities and people to solve the challenges of contemporary society, and based on Sustainable Development Goals (SDG), for the achievement of inclusive and sustainable development (Ranboldo, Arosio, 2018) shows. It is a conceptual framework which makes it is possible to rethink and formulate alternatives to sustainable human development with a differential approach and thus, guarantees a good human life in the community, where poverty and inequality have been significantly reduced from the face of the earth towards an ideal of eradication.

1.1. Theoretical framework

The referential analysis encompassing this chapter starts by pointing out a reflection upon social inequality and territorial inequality.

Conceptually, social inequality is in itself polysemic, since it finds in social protest a symbolism and a representation of the suffering or the taking of "social conscience" in the face of generalized problem situations in the country,

on the American continent, and the old continent. It is the *glocalization* of social protest.

Its causes locally originated, timely coincide with regional expressions within countries that, thanks to communications and social networks, scale *de facto* for the knowledge of the informed world in demand for a solution to problems such as exclusion, criminality and corruption, the modern conception of the family and gender violence, poverty, education, public health and underfeeding, unemployment and informality, and "That is a relatively short cycle, and in some cases, to the surprise of many, several countries in Latin America-Ecuador, Chile and Bolivia – have been shaken by political crises and widespread social protests" (Fundaciòn Carolina, 2019). Among them we have Colombia, with collective protesting actions unambiguously aimed at demonstrating against the abuses and forgetfulness that some social sectors are reduced to, and for the demand for better well-being by the state, governance, and governability.

Such social movements locally emerged and have traveled like sound waves through Latin America, reaching mass expressions before the declaration of a COVID-19 pandemic by the World Health Organization (WHO), but due to social distancing and the prolonged quarantines in the country and in the rest of the world, the closing of borders and paralysis of the economy, the social expression of protest concerning the situation of inequality and territorial inequity diminished, but did not disappear. These all remain in a state of rest in the coexistence of a moving "social magma" whose intensity and depth mainly depend on the inner conditions of each economy.

Studies though indicate the economic and social effects of COVID-19 represented in health as well as human and economic crises unprecedented in recent history that depict a rather dark picture, since the forecasts for 2020 are a reduction in world's GDP of around 5.2%, being 7.0% in developed economies and 1.6% in emerging economies (CEPAL, 2020).

In the case of Colombia, its GDP will experience a decrease of 5.6%, whereas projections of the number of people in extreme poverty in 2020 compared to 2019, will experience a percentage variation of 4 points, where poverty is 5.1% bigger (a step from 29% to 34.1%) together with a greater projected inequality of income distribution in the region. In the case of Colombia the Gini index forecasts that it will increase between 4.0% and 4.9% (CEPAL, 2020).

In addition to all this, the attack on formal and informal employment deepens the crisis that households had been observing before the pandemic, with both a reduction in their family income and an increase in informality, so a decrease in the employment rate, as of August 2020, meant 6.8 negative percentage compared to the same date in the previous year.

It should be noted that such structural difficulties, persistent in some of the problems stated but temporary in others (as a consequence of the pandemic), are worldwide common. The ante pandemic social protests are, for example, in Peru associated with events of political legitimacy; in Argentina

with the experience of a failed economic management that translates into economic recession, added to the loss of confidence in the current leader; while in Venezuela, the crisis of power together with the management of the economy have generated a degrading migratory process for the dignity of its inhabitants, which today is present throughout America, deepening the social crises of the locals in their quality of hosts.

In the meantime, Colombia known as a country of regions for its biodiversity, is no stranger to these events and movements arising from regional inequality that call for more economic, social, cultural, environmental, and political welfare actions from the central level.

This South American social and economic reality has also escalated to Nicaragua, Honduras, Guatemala, and Mexico in a social discontent supported by a loss of governance in the former and a discernible presence of violence in the latter. A situation from which Mexico's northern neighbor does not escape either, with issues such as abuse of the public force and the omission of the government in the face of what is known as white supremacy, generating more violence, thus deepening social inequalities.

As far as the category of territorial inequality is concerned, knowledge can be approached from several perspectives, among which regional analysis with limited information is pointed out through the research technique used from the theoretical and methodological proposals of Lira & Quiroga (2009), and Boisier (1980), where GDP information is used by region and activity.

Another is an investigative technique endorsed by Sala-i-Martin (1990), Barro & Sala-i-Martin (1991) and Silva Lira (2005), in reference to beta convergence analysis and sigma convergence, where it can be recognized whether a territorial convergence process took place during the study period making it possible to indicate if the regions (departments) have experienced growth or not and whether they have reduced disparities.

In this same sense, for the analysis of performance quadrants typologies of the economic evolution of departmental territories in comparison to growth averages and GDP per capita were considered as indicated by Silva Lira (2005), whose results were located in the quadrants called: potentially winning, ongoing, stagnant and retreating territories.

In keeping with the methodologies outlined in the previous section, there is also the departmental competitiveness index which is based on the analysis of four factors such as: enabling conditions, human capital, market efficiency and innovative ecosystem, and 13 pillars of competitiveness, which make it is possible to indicate which territorial entity is more competitive and likely to offer greater equal opportunities. Hence, it has a higher income and a better perception of satisfaction among its inhabitants, in addition to showing the problems that limit growth and social and territorial equity (Private Competitiveness Council and the University of Rosario, 2019).

Colombia's National Planning Department (Departamento Nacional de Planeación, DNP) also introduces the analysis of typologies based on territorial

entities, a methodology that seeks to identify homogeneous groups of territorial entities determined by their characteristics and needs, creating categories to define robust, intermediate, and incipient environments (DNP, 2015).

Another method – in the Colombian case – is the Territorial Equity Index, TEI (*Índice de Equidad Territorial, IET*) consisting of a synthetic indicator that helps to quantify the existing gaps between departments considering Sustainable Development Goals (SDG), presented in the Latin American poverty and inequality report (Rimisp – Latin American Center for Rural Development, 2020).

Similarly for the Latin American context, the Regional Development Index (IDERE LATAM) consists of a scale between 0.0 to 1.0 with categories ranging from low to very high, and based on its eight dimensions: education, health, well-being and cohesion, economic activity, institutions, security, environment, and gender; it shows Colombia at a medium level in the Latin American context. This place is shared with Mexico and Brazil, whereas within the country it presents development gaps between departments (Rodriguez Miranda, Vial Cossani, 2020).

1.2. Regulatory framework

Based on the expression "territory-region" (Escobar, 2013) and to improve the social, economic, institutional, and environmental development of territorial entities, the groupings of departments formulated in the Colombian law[1] for analysis purposes are presented in this chapter.

2. Materials and method

The objective that governs the reflection on Social and Territorial Inequality in Colombia aims to demonstrate the differences in development between regions in the country, based on the review of studies that used different methodologies, but that group their indicators and dimensions into a high percentage of the same variables to determine an index that leads to the characterization of the territorial entity.

Consequently, the documentary review of the existing literature in search engines allowed not only to know its status, but also to show the conceptual bases for updating and argueing the gaps between regions regarding the level of development.

Its construction starts from the analysis of the methodological processes adopted by different public and private entities with different investigations

[1] Law Number 2056 of September 30, 2020, "By which the organization and operation of the General Royalties System is regulated". Where the royalties constitute income from the exploitation of non-renewable natural resources.

into the above-mentioned areas, which have been presented as articles in scientific journals or as research reports in different settings. It is supported in the construction of synthetic indexes such as those shown in the work of Colombia's Departmental and Municipal Typologies *Departamento Nacional de Planeación* DNP [(2015; the Latin American Report on Poverty and Inequality, produced by Rimisp; the Human Capital Index (2020), a method used by the World Bank to measure the wealth of a country; the Departmental Competitiveness Index constructed by the Private Competitiveness Council-University del Rosario with the method developed by the World Economic Forum WEF; the analysis of convergence and territorial disparities from Colombia's DANE, and the Regional Development Index – Latin America (IDERE-LATAM)].

This chapter exerts to focus on the studies prepared by DNP and IDERE--LATAM, which allow inferring the obstacles that hinder a level of development under conditions of social and territorial equality within the regions in Colombia.

3. Development and Discussions

In different settings and latitudes, scholars refer to the precariousness of employment as cause of an alteration on welfare status achieved and therefore, transformed into a exponentiation of inequalities that involve different causes and origins to signify that society in general and in particular is objectified as a subject and is objectified with discrimination (Vite Perez, 2007). In exceptional moments such as the current one – during COVID-19 pandemic – it becomes more challenging, since the lack of services and a decent job or income generators, trigger both poverty and extreme poverty, which in themselves, were experiencing growth before the pandemic not only in Colombia, but throughout Latin America with massive demands for respect and guarantees of access to social, economic, political, cultural rights and, above all, a defense of life.

This is how the demand for rights in dignified conditions has generated a dialectical dynamic between knowledge and disciplines that seek to respond to the causes and effects of social and territorial inequality; inferring, at the prospective level, the scope of social movements and the social outbreak in the preservation of order.

In this context, the United Nations Development Program (UNDP) with the participation of its member countries in 17 SDGs includes the need to present a unified front to end poverty, protect and defend the planet. In other words, these objectives which are part of the world agenda for 2030, have then become a source of information to measure social and territorial equity.

Thus, different synthetic indicators to measure progress and specially to show the gaps between national and subnational regions that include different variables grouped at the level of dimensions emerge.

One of the many tools to measure the level of equality between departments (or regions) is the Territorial Equity Index (IET), which seeks to measure the degree of territorial equity (or magnitude of the gap) within countries. It is constructed on the dissimilarity index of each of the 19 indicators that are descriptors of the 7 SDGs, such as the end of poverty, zero hunger, health and well-being, quality education, gender equality, decent work and economic growth and reduction of inequalities (Rimisp, 2019). Its interpretation or reading responds to three categories. The first is an evenhanded distribution between 0.0 to 0.03; the second, with a medium inequity between 0.31 and 0.08, and the third, with high inequity if it is greater than 0.081.

According to Rimisp for some Latin American countries, this indicator (IET-SDG) for the year 2019 in Bolivia (0.0974), Chile (0.0786), Colombia (0.0999), El Salvador (0.06607), and Peru (0.1205), shows a range of medium to high territorial inequity, becoming evident the inequality of the region and within the countries, as can be seen in Table 1.

Now, the IET-SDG observed contrasts with the means in socio-economic indicators reported by those responsible for each country, in which progress is shown in the fulfillment of the SDGs, but this does not mean – as demonstrated in the work in reference and those prepared by DNP and IDERE-LATAM – the absence of gaps between the Departments, as it is in the case of Colombia.

If we temporarily focused the analysis on meeting the end of poverty goals (SDG1), national average would indicate (according to information from Colombia's Departmental and Municipal Typologies) that the country went from a proportion of monetary poor of 32.7% in 2012 to 27.8% in 2015, experiencing an average decrease per year of 1.63 percentage points, with a slight rebound in 2016, to then decrease in the following year and settle at 27.0% in 2018.

The same source projects though, that in 2019 and currently in 2020, a significant peak in the indicator, becoming even more worrying during the pandemic because regional gaps deepened lower, as evidenced in the departments of Chocó, where the incidence of monetary poverty in 2015 was 62.8% of the total population and in 2018 it presented a decrease of only 1.7%, followed by Guajira and Cauca, which occupy the dishonorable second place as departments exceeding 50% of the proportion of people in monetary poverty, also coinciding with the fact that these territories are the most affected by the armed conflict associated with criminal structures and drug trafficking routes.

Meanwhile, in 2018 the incidence of monetary poverty in *Córdoba, Magdalena, Cesar, Norte de Santander, Nariño, Sucre, Caquetá, Huila, Bolívar* and *Tolima*, fluctuates between 46.6% and 31.0%. Only 10 departments and the capital city of the country are below the national average (DANE, 2020).

Back to our general purpose of highlighting social and territorial inequality in Colombia, the Regional Development Index-Latin America (IDERE--LATAM), made up of 25 variables grouped in 8 dimensions and its comparative

Table 1. Results of the Territorial Equity Index (TEI) 2019, for five Latin American Countries

Country/TEI-DGS	Bolivia	Chile	Colombia	El Salvador	Perù
TEI-DGS General	**0,097**	**0,079**	**0,100**	**0,061**	**0,121**
TEI-DGS1. End of poverty	**0,169**	**0,218**	**0,212**	**0,112**	**0,264**
Poverty rate	0,086	0,197	0,192	0,056	0,200
Gender gap in poverty rate	0,330	0,242	0,235	0,226	0,349
TEI-DGS 2. Zero hunger	**0,171**	**0,109**	**0,185**	**0,078**	**0,191**
Child malnutrition	0,154	0,155	0,389	0,096	0,216
Income gap according to occupation	0,190	0,077	0,088	0,063	0,169
TEI-DGS 3. Health & Wellness	**0,166**	**0,074**	**0,130**	**0,060**	**0,215**
Child mortality	0,196	0,066	0,096	0,074	0,392
Doctors per inhabitant	0,122	0,133	0,142	0,097	0,268
Access to improved sources of water and sanitation	0,192	0,047	0,163	0,030	0,095
TEI-DGS 4. Quality education	**0,032**	**0,015**	**0,066**	**0,038**	**0,040**
Enrollment in primary education	0,006	0,002	0,033	0,008	0,017
enrollment in secondary education	0,023	0,010	0,033	0,053	0,016
Illiteracy	0,225	0,215	0,212	0,120	0,238
TEI-DGS 5. Gender equality	**0,090**	**0,111**	**0,126**	**0,136**	**0,134**
Gaps in illiteracy	0,204	0,328	0,284	0,421	0,269
Gap in labor participation	0,133	0,055	0,098	0,064	0,106
Gap in population without income	0,027	0,076	0,707	0,092	0,084
TEI-DGS 8. Decent employment and economic growth	**0,106**	**0,089**	**0,077**	**0,039**	**0,123**
Employment in non-primary areas	0,087	0,067	0,072	0,050	0,144
Net labor participation rate	0,044	0,039	0,031	0,017	0,024
Unemplyment rate	0,112	0,077	0,094	0,037	0,192
Child labor	0,293	0,031	0,165	0,072	0,346
TEI-DGS 10. Reduction of inequalities	**0,056**	**0,071**	**0,033**	**0,030**	**0,052**
Population below 50% of average income	0,088	0,079	0,049	0,037	0,082
Gini coefficient	0,036	0,063	0,022	0,024	0,033

Source: Prepared by Rimisp based on the National Household Survey (INE, 2018) and taken from the Latam 2019 report

reading with the theoretical maximum value of 1, shows the best possible performance. The distance between this and the result by departments shows how close or far the territorial entity is from the theoretical maximum potential development, which, decoded into development levels on a 0.00 and 0.30 scale, places them in entities with low development, while between 70 and 1.0 is considered to be very high development; the values between 0.30 and 0.70, allow to establish the categories as medium-low, medium, medium-high and high.

In this same sense, as can be seen in Table 2, the national average for IDERE corresponds to a low medium level and the grouping of the departments into regions according to the General System of Royalties, the Caribbean, Central-Eastern, and Coffee Axis present a medium level of development, with development gaps within the region, worrisome for the departments of *Guajira, San Andrés, Providencia, and Santa Catalina, North of the Santander* and *Quindío* whose IDERE is between 0.30 and 0.40 for a low medium level of development.

The Pacific region witnesses a deficient level of regional development and is located in the medium-low category, together with the Central-South-Amazon region, of which the Department of Putumayo is part. It is one of the furthest from the benefits of development, which is partly explained by its geographical position that has historically been affected by drug trafficking and the armed conflict that have alienated institutional presence and investment. On the other hand, the Plain region, made up of seven departments and the richest zone in hydrocarbon reserves, includes four departments at the low level of development, except for three departments that are located at the medium-low level.

The analysis by dimension allows to draw interesting conclusions that the perception of security in 60% of the departments is low, supporting the attitude of social movements that demand more security and respect for life from the state since in 2020, 126 social leaders have been assassinated and theft has increased. Also, they demand more presence of national institutions. This dimension groups 81.8% of the departments at a low to the medium-low level of development.

In general, regions (except for the environmental dimension that is located in the medium to a very high level and not yet reaching the theoretical maximum) present regional disparities even with an indicator between 0.30 and 70, for a medium level in other dimensions such as: health, education, wellness and cohesion, economy and economic activity, gender. This situation has forced the government authorities to contain and deactivate the ***social magma***, to introduce differential approaches to public policies encouraging regional development and reducing social and territorial gaps, to anticipate the consequences of political and economic instability that an alteration of public order implies, as has already been evidenced in other countries of the South American region.

Table 2. Regional Development Index – Latin America (RDI-LATAM)

Grouping of Departments according to the General Royalty System in Colombia											
Region	Departments	Global RDI-LATAM	Level of Development	Dimensions							
				Education	Health	Wellness and Cohesion	Economic Activity	Institutions	Gender	Security	Environment
Caribbean	Atlantic	0,470	Medium	0,625	0,794	0,326	0,502	0,376	0,499	0,234	0,597
	Bolivar	0,426	Medium	0,565	0,759	0,195	0,520	0,351	0,434	0,310	0,507
	Cesar	0,406	Medium	0,557	0,745	0,173	0,361	0,372	0,453	0,277	0,643
	Còrdoba	0,447	Medium	0,439	0,746	0,156	0,470	0,968	0,476	0,474	0,955
	The Guajira	0,378	Medium Low	0,460	0,712	0,113	0,425	0,285	0,589	0,276	0,716
	Magdalena	0,421	Medium	0,502	0,792	0,166	0,405	0,350	0,421	0,365	0,779
	San Andrès, Providencia and Santa Catalina	0,370	Medium Low	0,519	0,651	0,346	0,316	0,236	0,348	0,186	0,570
	Sucre	0,419	Medium	0,523	0,736	0,167	0,369	0,418	0,439	0,430	0,564
Middle East	Boyacà	0,476	Medium High	0,560	0,769	0,213	0,430	0,414	0,465	0,572	0,717
	Cundinamarca	0,520	Medium High	0,549	0,775	0,414	0,466	0,422	0,599	0,375	0,715
	North of Santander	0,392	Medium Low	0,516	0,737	0,196	0,388	0,318	0,442	0,186	0,748
	Santander	0,528	Medium High	0,581	0,778	0,361	0,545	0,415	0,560	0,458	0,666
	Bogotà D.C.	0,555	Medio Alto	0,687	0,845	0,472	0,555	0,373	0,600	0,403	0,631

Coffee Axis	Antioquia	0,464	Medium	0,601	0,782	0,366	0,536	0,321	0,489	0,186	0,709
	Caldas	0,413	Medium	0,522	0,775	0,276	0,384	0,335	0,392	0,328	0,426
	Quindiò	0,393	Medium Low	0,521	0,736	0,299	0,217	0,363	0,517	0,186	0,672
	Risaralda	0,458	Medium	0,551	0,776	0,383	0,413	0,353	0,485	0,186	0,834
Pacìfic	Cauca	0,387	Medium Low	0,449	0,736	0,125	0,471	0,335	0,439	0,255	0,774
	Chocò	0,307	Medium Low	0,420	0,627	0,090	0,289	0,320	0,348	0,186	0,597
	Nariño	0,385	Medium Low	0,406	0,734	0,130	0,490	0,357	0,571	0,290	0,471
	Cauca`s Valley	0,462	Medium	0,554	0,811	0,337	0,598	0,327	0,547	0,186	0,755
South Center-Amazon	Amazon	0,364	Medium Low	0,391	0,600	0,122	0,274	0,339	0,348	0,535	0,686
	Caquetà	0,363	Medium Low	0,449	0,705	0,173	0,306	0,297	0,392	0,186	0,904
	Huila	0,407	Medium	0,533	0,734	0,184	0,387	0,364	0,461	0,325	0,512
	Pututmayo	0,299	Low	0,380	0,704	0,118	0,146	0,321	0,348	0,186	0,809
	Tolima	0,440	Medium	0,495	0,733	0,235	0,443	0,346	0,544	0,308	0,712
Eastern Plains	Arauca	0,246	Low	0,391	0,512	0,101	0,052	0,318	0,348	0,186	0,773
	Casanare	0,303	Medium Low	0,470	0,683	0,198	0,262	0,471	0,348	0,280	0,626
	Guanìa	0,316	Medium Low	0,402	0,607	0,081	0,143	0,333	0,348	0,549	0,889
	Guaviare	0,253	Low	0,313	0,657	0,038	0,150	0,331	0,348	0,186	0,992
	Meta	0,433	Medium	0,525	0,698	0,295	0,369	0,412	0,506	0,186	0,779
	Vaupes	0,327	Medium Low	0,300	0,453	0,145	0,228	0,326	0,348	0,600	0,623
	Vichada	0,222	Low	0,332	0,655	0,088	0,029	0,293	0,348	0,236	0,705
Colombia	Average	0,395	Medium Low	0,488	0,714	0,215	0,362	0,368	0,448	0,306	0,699

Source: Rodrìguez Miranda & Vial Cossani, taken from the report RDI-LATAM (2019)

Table 3. Departmental typologies: A proposal to understand the Colombian territorial entities

Departmental grouping according to the General Royalty System(GRS)										
Region	Departments	Average	Departmental Typology	Development Environment	Urban Dimension	Economic Dimension	Quality of life dimension	Environmental Dimension	Security Dimension	Institutional Dimension
Caribbean	Atlantic	0,377	C	Intermediate	0,442	0,612	0,633	0,032	0,672	0,628
	Bolivar	0,357	C	Intermediate	0,214	0,623	0,482	0,557	0,637	0,347
	Cesar	0,310	D	Intermediate	0,133	0,610	0,464	0,350	0,521	0,407
	Còrdoba	0,289	D	Intermediate	0,092	0,454	0,204	0,361	0,798	0,402
	The Guajira	0,207	E	Early	0,103	0,466	0,160	0,082	0,472	0,370
	Magdalena	0,281	D	Intermediate	0,155	0,510	0,426	0,174	0,547	0,439
	San Andrès, Providencia and Santa Catalina	0,459	B	Strong	0,323	0,394	0,898	0,783	0,774	0,503
	Sucre	0,268	D	Intermediate	0,109	0,379	0,367	0,000	0,801	0,491
Middle East	Boyacà	0,359	C	Intermediate	0,082	0,606	0,574	0,517	0,610	0,486
	Cundinamarca	0,481	A	Strong	0,211	0,742	0,761	0,553	0,930	0,653
	North of Santander	0,292	D	Intermediate	0,187	0,475	0,518	0,612	0,153	0,392
	Santander	0,368	C	Intermediate	0,180	0,790	0,678	0,355	0,558	0,381
	Bogotà D.C.	0,633	A	Strong	1,000	1,000	1,000	0,459	0,608	1,000

Coffee Axis	Antioquia	0,415	B	Strong	0,325	0,843	0,703	0,695	0,351	0,405
	Caldas	0,315	D	Intermediate	0,140	0,460	0,655	0,065	0,523	0,680
	Quindiò	0,415	B	Strong	0,258	0,372	0,730	0,459	0,773	0,729
	Risaralda	0,408	B	Strong	0,204	0,471	0,796	0,475	0,510	0,809
Pacìfic	Cauca	0,264	D	Intermediate	0,063	0,499	0,407	0,382	0,265	0,496
	Chocò	0,214	E	Early	0,043	0,377	0,000	0,696	0,592	0,000
	Nariño	0,276	D	Intermediate	0,091	0,411	0,445	0,660	0,125	0,480
	Cauca's Valley	0,364	C	Intermediate	0,349	0,786	0,840	0,218	0,070	0,649
South Center-Amazon	Amazon	0,319	D	Intermediate	0,014	0,256	0,345	1,000	0,938	0,002
	Caquetà	0,214	E	Early	0,079	0,332	0,387	0,584	0,000	0,331
	Huila	0,331	C	Intermediate	0,094	0,401	0,536	0,520	0,592	0,502
	Pututmayo	0,311	D	Intermediate	0,071	0,463	0,297	0,984	0,424	0,248
	Tolima	0,296	D	Intermediate	0,130	0,479	0,593	0,357	0,521	0,285
Eastern Plains	Arauca	0,215	E	Early	0,106	0,321	0,500	0,560	0,099	0,130
	Casanare	0,322	D	Intermediate	0,113	0,659	0,555	0,251	0,501	0,496
	Guanìa	0,295	D	Intermediate	0,000	0,102	0,239	0,506	0,967	0,544
	Guaviare	0,203	E	Early	0,118	0,103	0,322	0,350	0,607	0,127
	Meta	0,373	C	Intermediate	0,141	0,816	0,613	0,641	0,075	0,699
	Vaupes	0,255	D	Intermediate	0,037	0,000	0,270	0,425	1,000	0,310
	Vichada	0,150	E	Early	0,075	0,032	0,102	0,565	0,370	0,053
Colombia	Average	0,322	D	Intermediate	0,172	0,480	0,500	0,461	0,527	0,439

Source: National Planning Department (NPD,2015), Departmental and Municipal typologies

Typologies of the departmental territories elaborated by the DNP and grouped by regions in this chapter are consistent with the previously mentioned works in their categorization, since their starting point was conceiving territorial development as an active space where interacting events take place, life is created and recreated, based on the use of endogenous potentialities and the resolution of social problems of power, production, and distribution in a synergistic relationship with nature. From this conception, the concept of environmental development arises as to the characterization of the territory where tangible and intangible events occur and can potentially generate synergies within its surroundings (supranational space), making it easier to achieve transformations that benefit and contribute to the sustainable development (DNP, 2015).

The study on typologies in the departmental case chose 19 variables and in the municipal one 18 variables grouped in 6 dimensions such as regional urban, living conditions, economic, environmental, institutional and security. The result is expressed in seven typologies and categorized in a robust development environment (typologies A and B), characterized by the highest proportion of the urban population, an important relative weight in the conformation of the GDP, good connectivity within the region and its surroundings, and could be defined as development poles. In this typology there are the capital city of the country, the department of Cundinamarca in the Central-East region; San Andrés, Providence, and Santa Catalina in the Caribbean region; in the Coffee Axis region there are the departments of Antioquia, Quindío, and Risaralda, for a benchmark of 18% of territorial entities in a development environment with a quality of life and averages higher than the national average.

The intermediate development category (typologies C, D, E) is present in 66% in the Caribbean regions excluding *Guajira*; the Pacific except for the Department of the *Chocó*; plains region, except for *Vichada* and *Guaviare*; in the Central-South-Amazon region, Caquetá is excluded; characterized by modest measurements that generate socio-economic and institutional gaps to promote sustainable development and consequently to attract and maintain the investment, requiring a coordinated effort between society-state-company.

Finally, 16% of the territorial entities at the departmental level, are located as an incipient development environment that includes the typologies E, F, G, characterized by having precarious socio-economic conditions, low connectivity, and dispersed population.

4. Conclusions and recommendation

The disciplinary interest and "thought centers" to measure social and territorial inequality have allowed the proliferation of tools and construction of methodologies that contribute to traceability of the behavior of variables and indicators that make up the environmental, social, economic, and institutional

political dimensions which support the concept of sustainable development of the territorial system. These are based on the need to respond to those guiding principles such as sustainability, equity, competitiveness, and governance, in a context of a better world for all according to the United Nations 2030 agenda, and that in the case of Colombia, show the need for immediate action by the institutions to close social and territorial gaps towards promoting equality of inclusion, opportunities, and income distribution.

This implies investing in the territories, more importantly, giving the population the opportunity for a better life and a better living, as indicated by the studies that have been presented in this chapter related to social and territorial inequality.

It is dejected that, reviewing the figures of one of the indicators of social and territorial inequality, one can find that in 2011, 30% of the territorial entities known as Departments, of which 60% are located in the Caribbean region, concentrated the highest indicators in UBN, a range of 40.26% and 50.83% of the proportion of people in *Bolívar, Córdoba, Guajira, Magdalena, Sucre, San Andrés, Providence* and *Santa Catalina*; whereas the plain region accounts for 30% of the UBN with the departments of *Guainía, Vaupés,* and *Vichada* in a range of 40.26% to 45.66%; correspondingly, in the Pacific region 10% of the departments that make it up are in UBN equal to 81.9%, that is, of every 100 people who inhabit it, 82 are in UBN, and this is the case of the department of *Chocó*.

In the rest of the regions and departments that respond to the grouping designed in the scheme of the general system of royalties in Colombia, the condition in UBN can be classified as mild to moderate on a scale of 13.29 to 34.02% (DANE, 2011).

Now after 7 years, when carrying out a comparative analysis on the status of Unsatisfied Basic Needs of the aforementioned Departments, it can be seen that in 2018 this indicator was set in a range between 26.50% the lowest proportion of the population in UBN, and 68.89% the highest proportion of the population with UBN (DANE, 2018). In the case of the Department of *Chocó*, an improvement is evidenced with a reduction of 16.54%, but opposes the case of the Departments of *Guainía, Vaupés,* and *Vichada*, where an increase of 13.55%, 28.63%, and 25.68% are respectively evidenced, with the characteristic that they are territories with low population.

Observing an advance or improvement in the well-being of the Colombian population is yet undeniable that social inequalities persist between territorial entities and are followed by a deterioration in the perception of safety and respect for life. They have increased since the signing of the peace process, the death of social leaders and human rights defenders, with a presence mainly in those territories with the greatest deficiencies and inequalities.

The model of grouping departments in regions under the provisions of the General System of Royalties, responds to a need for intervention in the allocation of resources and the prioritization of projects with sources from the

exploitation of non-renewable natural resources in a public policy purpose, to make all territorial entities benefit from this source of wealth. However, the truth is that within the regions, the presence of inequality gaps in the social and territorial areas is evident, which has been persistent for the last 20 years of the 21st century.

In some departments though, as indicated by the data of the different methodologies to establish territorial categories, it seems that the institutional presence and investment were behind the people, since poverty, exclusion, violence, and the lack of opportunities are a constant, and they place progress back in a period matching those on the last decade of the last century. This situation, controverts the general principle of the United Nations regarding the SDGs to face inequality, and is "not leaving anyone behind" (United Nations, 2020). Therefore, apparently important population groups and territories are lagging in the face of progress and extraordinary economic growth.

If the national and territorial governments want to deactivate the "*social magma*" sustained by social and territorial inequality, inclusive public policies and inclusive markets, which become conditioning factors to eliminate or drastically reduce the factors that generate political instability in the region, must be generated, since they are held accountable for the loss of governance and governability. They are also responsible for promoting migration within and between regions, slowing down economic and social progress, and promoting class division.

Bibliography

Barro, R. & Sala-i-Martin, X. (1991). Convergence across states and regions. *Brookings paper on economic activity*, 1.

Boisier, S. (1980). Tècnicas de anàlisis regional con informaciòn limitada. *Cuadernos ILPES-CEPAL*, II(27).

CEPAL (2018) Naciones Unidas. https://www.cepal.org/es/temas/desarrollo-territorial (access: 1.04.2018).

CEPAL (2020). *Amèrica Latina y el Caribe ante la pandemia del COVID-19. Efectos econòmicos y Sociales*. Santiago de Chile: Naciones Unidas.

Consejo Privado de Competitividad y Univeersidad del Rosario (2019). Ìndice Departamental de Competitividad 2019. Bogotà, D.C.: Panamericana Formas e Impresos S.A.

DANE (2011). Resultados Censo General 2005. Necesidades Bàsicas Insatisfechas-NBI, por total, cabeceras y resto segùn departamento y nacional a 31 de diciembre de 2011. Bogotà D.C.: DANE.

DANE (2018). Colombia, Principales indicadores CNPV 2018. Necesidades Bàsicas Insatisfechas (NBI) total, cabeceras, centros poblados y rural disperso, a nivel nacional y departamental. Bogotà D.C.: DANE.

DANE (2020). Incidencia de la Pobreza Monetaria, Departamentos y Bogotà D.C. 2002-2018. Bogotà D.C.: Dane.

DNP (2015). Tipologìas Departamentales y Municipales: Una propuesta para comprender las entidades territoriales colombianas, Bogotà D.C.: Departamento Nacional de Planeaciòn, Direcciòn de Desarrollo Territorial Sostenible, Grupo de Estudios Territoriales.

https://colaboracion.dnp.gov.co/CDT/Desarrollo%20Territorial/Tip-FormatoPublicacion%20(tipolog%C3%ADas)%2023.pdf?Web (access: 10.10.2020).

Escobar, A. (2012). Beyond Development: Post-development and Transitions towards the Pluriverse. *Revista de Antropologìa Social*, 21, 23–62.

Escobar, A. (2013). Territorios de diferencia: la ontologìa polìtica de los "derechos al territorio". *Economìa Colombiana*, 340, 9–20.

Fraser, N. (2008). La justicia social en la era de la política de identidad: redistribución, reconocimiento y participación. *Revista de Trabajo*, 4(6), 83–102.

Fraser, N., & Honneth, A. (2006). ¿Redistribuciòn o reconocimiento? Un debate polìtico -filosòfico. Madrid, España: Ediciones Morata, S.L.

Fundaciòn Carolina (2019). https://www.fundacioncarolina.es/crisis-politicas-y-protestas-sociales-en-america-latina/ (access: 15.10.2020).

Galvis, L.A., & Meisel Roca, A. (2010). Persistencia de las desigualdades regionales en Colombia: Un anàlisis espacial. *Banco de la Repùblica*, 120, 1–44.

Gordillo Bedoya, F. (2005). El Habitat: mutaciones en la ciudad y el territorio. (www.Redalyc.org/pdf/39600308.pdf, Ed.). *Tabula Rasa*, 3, 137–149.

Honneth, A. (1997). *La lucha por el reconocimiento. Por una gramàtica moral de los conflictos*. Barcelona: Crìtica.

León, G. (2013). Crecimiento y convergencia económica: una revisión para Colombia. *Dimensión Empresarial*, XI(1), 61–76.

Lira, L., & Quiroga, B. (2009). Tècnicas de anàlisis regional. *CEPAL*.

Monacayo Jimenez, E. (2001). Santiago de Chile, Chile: CEPAL-ILPES.

Muñoz Velasco, L. (2018). *La Influencia del Sector Hidroelèctrico en el Desarrollo Sostenible del Territorio Huilense*. Manizales: Universidad de Manizales.

Nussbaum, M. (2002). *Las mujeres y el desarrollo humano*. Barcelona: Heder Editorial S.L.

PNUD (2011). *Colombia rural. Razones para la esperanza. Informe nacional de desarrollo humano*. Bogotà, D.C., Colombia: Naciones Unidas.

PNUD (2018). ODS en Colombia: Los retos 2030. https://www.undp.org/content/dam/colombia/docs/ODS/undp_co_PUBL_julio_ODS_en_Colombia_los_retos_para_2030_ONU.pdf (access: 31.10.2020).

Psathakis, J. et al. (2010). *Una aproximaciòn al ordenamiento ambiental del territorio como herramienta para la prevenciòn y transformaciòn democràtica del conflicto socio-ambientales* (vol. I). Buenos Aires, Argentina: Fundaciòn Cambio Democràtico y Funadciòn Ambiente y Recursos Naturales.

Ranboldo, C., & Arosio, M. (2018). FAO. http://www.fao.org/in-action/territorios-inteligentes/articulos/colaboraciones/detalle/es/c/1095483/ (access: 15.10.2020).

Rawls, J. (1971). *Teorìa de la Justicia*. Mèxico, D.F.: Fondo de Cultura Econòmica.

Rendon Acevedo, J. (2007). El desarrollo humano sostenible: ¿un concepto para las trasnformaciones? *Equidad & Desarrollo*, 7, 111–129.

Rimisp – Centro Latinoamericano para el Desarrollo Rural (2019). Pobreza y Desigualdad. Informe latinoamericano, Juventud rural y territorio. Santiago de Chile: Rimisp y Fida.

Rimisp – Centro Latinoamericano para el Desarrollo Rural (2020). Pobreza y Desigualdad, informe latinoamericano juventud rural y territorio. Santiago de Chile: Rimisp.

Rivera Paez, J.A. (2004). Concepto de Hàbitat. *Revista de Arquitectura*, 6, 36–37.

Robertson, R. (2000). Bibloteca Virtual. Recuperado el 14 de 05 de 2018, de www.cholonautas.edu.pe: https://uvirtual.udem.edu.co.

Rodriguez Miranda, A., & Vial Cossani, C. (2020). *IDERE LATAM. Indice de desarrollo regional-latinoamerica*. Santiago de Chile: Universidad Autonoma de Chile, Instituto Chileno de Estudios Mundiales, FCEA, Instituto de Economìa, Universidad de la Repùblica de Uruguay.

Salas-i-Martin, X. (1990). *On Growth and States*. Boston, Estados Unidos: Universidad de Harvard.
Santos, M. (2000). *La naturaleza del espacio*. Barcelona, España: Ariel.
Sen, A. (1998). Capital huamon y Capacidades humanas. *Cuadernos de Economìa*, XVII(29), 71–76.
Silva Lira, I. (2005). Desarrollo econòmico local y competitividad territorial en Amèrica Latina. *CEPAL, 85*, 81–100.
Taylor, C. (2003). El multiculturalismo y "la polìtica del reconocimiento". Mèxico, D.F.: Fondo de Cultura Econòmica.
United Nations (2020). World Social Report 2020. New York: Department of Economic and Social Affairs, Multimedia Library Publications. https://www.un.org/development/desa/es/news/social/world-social-report-2020.html (access: 31.10.2020).
Vite Perez, M. (2007). La nueva desigualdad social. *Problemas del Desarrollo. Revista Latinoamericana de Economìa*, 38(148), 41–68.

Abstract

Social and territorial inequality in Colombia

The paper discusses the development gaps between Colombian regions.

On the basis of the extensive literature review the indices used by National Planning Department (Departamento Nacional de Planeaciòn) and IDERE-LATAM index are selected. Referring to the concepts of social inequality and territorial inequality, and using departmental typologies, the analysis of development environments on the regional level is conducted. Synthetic indicators are used to measure development progress and to show the existing gaps between the regions.

The way to combat social and territorial inequality is to reduce the factors that generate political instability in the region. These are the loss of governance, the promotion of migration within and between regions, the slowdown of economic and social progress and the promotion of class division.

Keywords: social inequality, territorial inequality, social magma

Rural youth and migration. Lessons learned in times of pandemic

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1. Introduction

The global experience of the COVID-19 pandemic, the prolonged quarantine periods regulated by the Colombian government, partly through the transfer of international policy in the face of the pandemic as well as giving priority to calls for social distancing and confinement, are geopolitical figures that have transcended the national borders of the vast majority of countries in the world. This has led us to live a historic moment for humanity and, in particular, for the rural world, a moment that has left us with an infinite number of questions, uncertainties, risks, dilemmas and lessons regarding rural migration and, in a parallel manner, multiple contingencies, situations and opportunities for the present and future of rural youth in Colombia.

In this context, the specific problem addressed in this article places rural youth migration in a broader debate, linked to general issues such as globalization and generational change in the rural world, which have become more relevant during the 2020 pandemic because of their relationship to issues such as food security, sustainable rural development, and policies for body care and their geographic implications and the value of natural resources and ecosystem balances. There is an urgent call to review ways to face the crisis of the global world and the classic neoliberal model, to review a development of policies that geographically privilege urban environments, tending to forget their direct relationship and dependence on rural areas as the main guarantors of food security and care for nature. The specific problem addressed in this article is part of a broader debate on sustainability, which links us, on the one hand, to issues such as policies aimed at the rural world and multiculturalism, while at the same time linking us to the debates on the crisis of society centered on urban development and the classic model of capitalist development and globalization. From this perspective, the study aims to contribute to the identification of the meanings of rural life that some rural youth are building, based on their inclination to remain or not in the countryside in times of pandemic.

The interest of this study corresponds to that announced by Eugenio, Mejía, Valadez, and Márquez (2014), who, from a study of social mobilization in a rural community, point to the growing concern about the impact of constant inequalities within a society and among diverse societies, especially the rural ones, where avoidable injustices such as the lack of life opportunities for young

people are intensifying. According to Checa et al. (2006), these are aspects that constitute a framework of vulnerability, which is at the roots of migration, and in the case of rural youth, it tends to be one of the main ways out of their conflictive reality at the territorial, socio-cultural and political levels.

2. Methodology

The methodology consisted of qualitative research (Creswell, 2009), containing main characteristics according to Denzin and Lincoln (2013), and a multi-methodological approach, which implies an interpretive and naturalistic approach to its object of study. Therefore, semi-structured interviews were conducted with young people in their own rural habitats, which allowed them to be in their natural environment.

The information collection techniques used were tele-call, WhatsApp social network and Google Meet virtual meetings, which allowed the application of the instruments, addressing informed consent and making the respective recordings. The researcher conducted semi-structured interviews with young people, collecting words, narratives and expressions, which were analyzed inductively, focusing on the assessment of the meaning of the participants, their experiences with the issues related to staying or migrating from the countryside. The interview was guided by the following guiding questions: What does living in the countryside mean to you today? What aspects of the rural area you like and dislike? How do you see yourself in five years? What importance do rural youth have for the development of your region? How has your region been affected by the COVID-19 pandemic? How has your family been affected by the COVID-19 pandemic? What importance does the rural world have in these times of pandemic and quarantine?

The study was carried out among young people from three municipalities in the department of Caldas (Manzanares, Neira, Aguadas). The common characteristic was to have more than 80% respondents coming from rural areas, where the economy was based on agricultural production. Ten young people took partand the inclusion of both genders was identified. In addition, two focus groups were held to discuss the changes in the rural world during the year 2020. The analysis of the information attempted to make sense of and interpret the testimonies, based on the meanings that the young people in this study give to rural migration, especially from the lessons learned about rural life left behind during prolonged quarantine in Colombia.

3. Theoretical framework

The theoretical value of the field of knowledge of this study is not limited exclusively to the reflections developed by the traditional models, but recognizes the field of sustainable development as the starting point of the current

proposals of the United Nations. In particular, this study is based on the need for a complex approach to the reality of rural youth, for which some theoretical guidelines are presented.

Despite the large number of studies registered, authors such as Kessler (2006), Mesen (2013), Jurado and Tobasura (2012), have pointed out significant shortcomings in the theoretical development of rural migration, especially among rural youth. As a result of other factors such as the conceptual ambiguity of the phenomenon, the limitations of its measurement and its multifaceted and interdisciplinary nature it is difficult to understand all aspects of rural migration. In addition, in the existing literature on the subject it is common to find gaps between the theory and the reality of rural youth, in particular referring to those who live in the Colombian coffee region taking into account that these populations have historical importance in the dynamics of generational change in the rural world today, as well as in the search for alternatives for the agricultural and rural development of the region and the country. Another study conducted by Alan de Brauw, entitled "Rural youth: determinants of migration throughout the world" (2019), explores the determinants of selected migration decisions made by rural youth in seven countries, including examples in Latin America (Mexico), Asia (Bangladesh, Indonesia, Nepal and Pakistan) and Africa (Nigeria and Tanzania). While papers exploring migration decisions often describe migrants as "young" in relativion to the rest of the population, this paper specifically isolates youth migration to understand the specific determinants of the decisions they make about whether to migrate better. In addition, the paper generally uses nationally or quasi-nationally representative data sets, thus improving understanding of migration decisions made by young people in a wide range of cultural contexts and levels of economic development. The studies reviewed emphasize the problem of rural youth migration and its relationship with the trend in the search for ways out of their conflictive reality, which is marked by vulnerability (Suárez, 2006).

The study on rural youth migration in Mexico (Hernández, 2007), is limited and dispersed when compared to studies on urban youth, currently in Colombia, a topic that does not differ from Mexico, until its approach becomes more arid. Pardo (2017) approaches to the diagnosis of rural youth in Colombia are a considerable contribution. He states that the place of rural youth should be transcendental when it comes to building a future for all, but their perspective, views, voices, interests and predilections "have been made invisible both in public policies and in the processes of building development dynamics, in addition to research in these areas, given their predominant absence as influential actors in this process". Therefore, the new context of the times of the pandemic makes it urgent to take a deeper and broader look at rural youth, making it possible to account for the broad transformations in rural life in recent decades, the value of the rural world as a guarantor of the living conditions of all society in general, the social conditions, the internal

and external dynamics related to the rural world, the subjectivities involved in this process, and the current forms of social and economic integration of rural youth in this research. The rural world of Latin America is changing, and the old preconceptions about its forms of development, work dynamics, and the place of agriculture are no longer useful (Pardo, 2017). To understand the migration of rural youth in Colombia, we must go beyond the urban/rural dichotomies and understand the connections and relationships between the countryside and the city, and in this case the aspirations that rural youth are beginning to have from the year 2020.

3.1. Rural youth in a globalization perspective

It is necessary to identify to what extent the main approach to define social limits of rural youth is part of national public policies, which in recent decades have been influenced by the globalization of the UNESCO, ECLAC and FAO policies. This global policy framework will make it possible to understand and criticize the schemes with which capital and the state exercise their function in such a way that they make visible or deny rural youth. It will also show how being immersed in a globalized world allows us to give an account of the social and spatial expressions thatreveal, from the global/local point of view, both the exploitation of labor and the resistance (Piñeros Lizarazo, Junior, 2016), which young people constitute through global influences such as the media (social networks). In addition, they tend to present a greater closeness and handling of new information technologies (Muñoz, 2015) and forms of socialization and knowledge acquisition, which is why they can be considered potential actors in their territories.

3.2. Reflective approaches to rural youth in the perspective of globalization and generation

Within these two categories, it is possible to configure a set of transformations in the perspective of globalization and generation. Its limited approach nowadays does not yet suffice to configure the vulnerability of rural youth (Pardo, 2017); they continue to have fewer labor opportunities for decent employment and fewer possibilities of access to quality education. This leads to a progressive aging of the countryside and raises questions about the future of the agricultural world and the food security of the countries.

The purpose of the article was not to generalize the situations identified in the field of migration research and in particular the migration of rural youth, but to show the strong trends, which emerge in Colombia and Latin America, related to generational and globalizing conditions of youth in the rural environment. The documentary study indicated current and relevant issues for the field of earth and environmental sciences in Colombia and the world, especially considering the gaps in its works on schooling and its relation to

the fates of farmers and peasants' sons and daughters. Based on this study, we need to ask ourselves how rural territories can become a potential catalyst for the aspirations of rural youth: we also need to ask about the opportunities and restrictions generated by formal institutions that interfere with the life of rural youth (public policies for rural youth) and informal institutions (culture, beliefs and social practices). They can be inclusive or restrictive as a result of the productive structures of these spaces. We need to know which actors, coalitions and agencies manage to place their interests in this dynamic process, and who are marginalized.

According to the works reviewed, the generation gap has been narrowing, the social limits of the life cycle defined as youth, tend to be permeated by the configuration of forms of sociability anchored in extreme individuality, based on the anxiety of consumption, fears of the precarization of life, the denial of the way of life of social origin. These conditions, which are contradictions produced in the field of socio-metabolic innovations, require an analysis of the social limits of the life cycle defined as youth, with the expression of a generation that carries the legacy of generational responsibility that encourages the possibility of having a world where the threats of globalization are overcome, and faces the challenge of building a sustainable society.

In the last decade in particular, the educational gaps between men and women have narrowed and are now even favorable to women in rural areas (Pardo, 2017). The same author states that today's rural youths are different from previous generations in terms of their higher level of education, greater flexibility, willingness to change and openness to innovation, as well as their interest in new information technologies and their incorporation into new forms of socialization and knowledge acquisition, making them potential leaders in their territories.

4. Results

Below are some results of the study, in view of the participants' testimonies.

4.1. Resignification of the rural world in the midst of globalization and guarantines from the perspective of rural youth

Based on the testimonies of the young people in this study, there is recognition of the value of the countryside, even more so because of Colombia's prolonged quarantine time in 2020, especially because the conditions for food production are there and its natural resource systems contain sources that are true guarantors of life, as expressed: "The countryside has many opportunities to survive because obviously let's say, the countryside at this time has a percentage of 1 to 10, for me it has 9, the city has 4, in the countryside we are more benefited in everything, the wealth we have in natural resources, there is no factory no

matter how much capital it has that does not need the countryside, without the countryside how the city would be sustained; for example, the potatoes, which are grown, the banana, coffee ... if the farm is not cultivated you could not eat in the city, the countryside is beautiful, we have water and food on hand" (A. López, interview, August 5th, 2020).

This may lead to considering the risks of globalization which has concentrated on urban development and has left aside the rural one. This factor has contributed to the migration of rural youth in the coffee region, putting food security and natural resources at risk.

4.1.1. Assessment of the agricultural contribution of the rural environment to a country

There is recognition of the value of the contribution that rural youth make with their agricultural work to the economy of a country like Colombia, as evidenced by testimonies in the following order: "Living in the countryside for me means a great pride, since the country lives from agriculture and we are the ones who contribute to the country's economy, Colombia's economy is largely based on what the countryside produces, without the countryside the cities would fail because they would not have anything to eat" (C. Giraldo, interview, August 5th, 2020).

The above indicates how young people recognize their contribution to the food security of a society and a country as without food life in the cities would become unbalanced.

4.1.2. Sense of well-being of rural life

It is possible to emphasize the sense of well-being that rural life gives, which is related to the feeling of tranquility, lack of violence present in the cities, greater freedom, possibilities of working near home and enjoyment of nature, as it is demonstrated in the following testimonies: "Living in the countryside means tranquility, there is no violence, there is freedom to do many things without fear of being hurt, you can work in the same area and you can enjoy nature" (S. Campuzano, interview, July 24th, 2020). "No car sounds, no rumbling, it's tranquility I wouldn't want to change" (N. Cardona, interview, July 28th, 2020). "It is being able to breathe clean air, not being exposed to visual, auditory and vehicle pollution" (A. López, interview, August 5th, 2020).

4.1.3. Opportunities for rural life from the perspective of rural youth

It is important to guarantee young people access to capital and an opportunity to carry out their projects: "The countryside has many advantages, we don't value it, we need capital to produce, I wish I had capital to improve the orchard and the production of pigs, chickens, avocado, COFFEE, I think in

polyculture to generate income, it would be very important to have support to formulate and manage a productive project, I know something about managing agricultural production, I know its advantages and possible problems to face" (A. López, interview, August 5th, 2020).

It is necessary to heighen young people's sense of life. To do this, it is necessary to strengthen productivity, labor, commercial and sustainable terms of the agricultural processes in which young people have been involved. "I have goals, I have avocado cultivation and I sell the avocado to a company that exports to another country and that's why I project myself taking care that the avocado comes out well so I don't lose this client. I also have cattle and goals on the farm to make it more productive, I will see if I can fulfill them, I will improve the land and I will give employment to the people of my region" (S. Campuzano, interview, July 24th, 2020).

From the youth's point of view the job opportunities that the city offers to people from the countryside do not compensate for what is left behind as low wages are not enough to meet the needs. "There are few young people in the village, they go to the city to study. They believe that the city gives more than the country, but I think not, here you must work harder but it is better. I think that a minimum wage paid in the city is not enough, because you have to take transportation to work and you have to pay for everything, it's more complicated. For ten years young people have been going to the city, but I'm staying here because it's better and quieter" (S. Campuzano, interview, July 24th, 2020).

4.2. The value of youth for the generational change of the rural world

Young people recognize that they are guarantors of the development of their region, even more so when they know about the depopulation of the rural sector and its value for the whole society, as expressed below: "We are the future of the region, if we stay we can generate employment with productive projects. Currently the countryside is depopulated and the young people are leaving, let's do everything to save the countryside" (A. López, interview, August 5th, 2020).

Young people in the countryside can shape their future, especially if they manage to train and update themselves in technology. They understand that these are issues that can be dealt with as long as there is a connection between the urban and the rural: "Young people are very important, I think the future is also in the countryside, we must return to the countryside prepared to generate agriculture-related businesses, improve technology and help the community, you can join the urban with what we can generate in the countryside" (V. Aguirre, interview, July 28th, 2020).

Building roads is a proposal that young people themselves make when they undertake community programs in which they teach about crops and the value of their land and their region. In this sense a young man says: "In five years

I see myself at the farm helping the community and teaching the children to work on the land and stay here, not to leave their farm and to help them visualize their stay in the region" (A. López, interview, August 5th, 2020).

Another reason for the importance of generational change in the rural sector is related to a young rural population, which, due to its life cycle, may have greater goals than the older adult population, who, due to their life cycle, have no goals. As one young man points out: "I see that the older people have no goals, the young people have more dreams and capacity to work the land, although we are few here" (S. Campuzano, interview, July 24th, 2020).

In rural life one has the opportunity to learn to work the land from the teachings of the parents, who hope to see their children able to work on their farm: "I am grateful that mother taught me to work on the farm, so I know how to handle crops, this gives me a peace of mind to have the basics. We are the hope of the parents, of the grandparents. At some point we young people must show that we are capable of doing some work on the farm" (N. Cardona, interview, July 28th, 2020).

The need to prevent the countryside from being inhabited mostly by an aging population is raised. To avoid this, the importance of promoting projects that link young people is acknowledged; their purpose is to improve agricultural production, as a young rural woman expresses: "We need young people from the countryside who want to work here, it is necessary to generate projects aimed at technifying the countryside and giving added value to agricultural production that will lead young people to stay" (N. Cardona, interview, July 28th, 2020).

The generational change becomes tense when young people do not see opportunities to develop their life projects in the rural world and feel abandoned by the state, a situation that forces them to migrate to some cities in Colombia; in some cases they go abroad and even engage in risky work such as "drop by drop" as evidenced in the statement below: "Many young people do not have support from the state, both in the rural and urban areas; some work in the countryside paid very little, without life insurance and economic stability. This makes many young people leave, for cities like Bogota, Medellin, Caliand countries like Brazil, Mexico, Costa Rica, Argentina, Spain and the United States. I found out about a young man who went to Costa Rica, he works as a loan officer at the 'drop by drop', it's a money loan with interest" (C. Giraldo, interview, August 5th, 2020).

4.3. The rural world in times of pandemic from the perspective of rural youth

The pandemic has generated new realities for rural life. At the national economy level there was an increase in the price of coffee, which was representative for the Colombian economy; at the municipal level the closure of bars and pubs was an important factor, as those who frequented them began to consume less

alcohol and have resources that led them to improve the family food basket and buy materials needed for their farms, as one of the following testimonies points out: "The pandemic has affected the Region in another way, I think it is good because coffee has gone up in price, the bars have closed and people are already taking more remittance home and are investing in equipment for their crops, there is no consumption of liquor because of the ban; the negative things is that food prices have gone up" (A. López, interview, August 5th, 2020).

The experiences of the quarantine showed the countryside as a place where in the midst of the restrictions, one can live with greater freedom and even with the possibility of accessing conditions of economic improvement, due to the increase in prices of basic agricultural products as expressed below: "In these times, we have felt a lot of freedom, the countryside has been normal, food is not lacking, the situation is not so difficult, everything produced is being sold, the price of bananas and oranges has gone up" (C. Giraldo, interview, August 5th, 2020). "The closure of the bars in the town led to a decrease in the consumption of alcohol by the peasants and to the availability of money for other family needs" (A. López, interview, August 5th, 2020).

The times of pandemic made young people recognize the importance of their presence in the rural world, from valuing their work as food producers to realizing how these times have generated opportunities for marketing their products. Rising prices of food in cities increased profits of its producers, which is confirmed by this statement: "We young people produce food, we have not been affected, fortunately, when we sell products, we have done better, the prices have gone up and the banana and coffee prices have risen, while for those who live in the region and do not produce and for those in the city, the purchase prices have increased" (S. Campuzano, interview, July 24th, 2020).

In a complementary sense it is mentioned: "The pandemic made us see the importance of the countryside, here food is produced, the city depends on the countryside, otherwise this would make a region have to import it" (A. López, interview, August 5th, 2020).

Young people see that the prolonged lockdown in Colombia affected retailers: "The pandemic has left those who have been most affected in the business of bars, liquor sales, billiards and those who have had places to carry out entertainment activities" (A. Giraldo, interview, August 5th, 2020).

4.3.1. Being an active subject of rural life, the lockdown from a distance

In the rural world the threats of pandemic are not so grave, there are jobs, access to food, whereas in the municipal capitals one of the consequences of lockdown has been the increase in food prices and restrictions in the mobility. "I have not been affected by the quarantine, I keep working on the farm. Here I have food, freedom, and less danger with the pandemic, and of course we take care of ourselves" (S. Campuzano, interview, July 24th, 2020).

5. Conclusions

From a historical perspective, rural youth are the owners of the generational legacy of their peasant ancestors as a political determinant. Its essence lies in being the provider of food, the caretaker of natural resources, the owner of a rural culture and ancestral wisdom that is invaluable for the well-being. From this perspective, it is important to continue advancing research proposals and working with rural youth to strengthen the transgenerational processes and dialogues that are underscoring the transfer of knowledge and ways of life of a generation. It is necessary to lay the groundwork for a new political organization, administrative management and development aimed at strengthening the construction of sustainable rural territories that are viable for the consolidation of rural life scenarios that will enable rural youth to implement their life projects, which are extremely important for strengthening the generational change in the countryside, which in turn guarantee the conditions for life in urban scenarios.

The pandemic times and vulnerabilities of the urban world in 2020 reflect a tendency to stop considering migration as a life option, as young people interviewed for this study find a higher quality of life in their rural world. In this sense, they reflect hopes for greater participation in the labor market, improved economic income, access to education in fields that can provide an answer to some of the agricultural and rural problems of their environments, greater access to the Internet and strengthened relations with the state.

This study allows the formulation of questions related to the migration of rural youth in the Colombian Coffee Region, in times of pandemic and post-pandemic, such as: *What education and training do rural youth need in order to create rural scenarios that will lead them to see possibilities for building their future there?, What public policies can strengthen the generational change in the rural environment of the Colombian Coffee Region?*

Carrying out this work in the midst of the restrictions on movement typical of prolonged lockdown in Colombia in 2020, created, in methodological terms, the need to reach the population by means such as cell phones, tele-calling, social networks and virtuality, as means for the collection of information that allowed participants to be in their natural environment, reduce the costs of the study and optimize the time of the researcher.

6. Recommendations

Rural youth issues have not yet managed to enter public agenda with the importance that this has for the development of Caldas, the Colombian coffee region and Latin America as a whole. The great challenge is to become aware of the protagonism of rural youth and to strengthen their vision as "subjects of rights", for the full exercise of citizenship and the establishment of social and institutional guarantees, respect and compliance with their fundamental rights.

The proposals oriented to promote youth organization and political practices that energize their leading role in a society should be supported. They become a powerful scenario to reduce the exposure that rural youth in Colombia suffer. They are vulnerable, particularly because of their territorial condition to the scenarios of violence, caused by an armed conflict of more than five decades. In view of this, there is a need to continue conducting studies aimed at reconstructing the collective memory of youth's leading role in society, from a geobiopolitical perspective and a vision that values the possibility of rural youth to become political subjects capable of contributing to sustainable rural development in their territories and communities.

Bibliography

Centro de Investigación en Alimentación y Desarrollo. Disponible en: https://www.redalyc.org/pdf/417/41742710006.pdf (access: 25.09.2020).

Checa, F., Checa, J.C. y Arjona, A. (2006). Menores tras la frontera. Otra inmigración que aguarda. Organización de las Naciones Unidas Objetivos de Desarrollo del Milenio (ODM). Barcelona: Icaria (p. 17-50). Disponible en: https://www.un.org/sustainabledevelopment/es/sustainable-development-goals/ (access: 02.12.2019).

Creswell, J. (2009). Diseño de Investigación, Métodos Cualitativo, Cuantitativo y Mixto. Los Ángeles, London, Nueva Deli. Impreso en los Estados Unidos de America.

De Brauw, A. (2019). Rural youth: determinants of migration throughout the world. JLIFAD Investing in rural people. Disponible en: https://www.ifad.org/documents/38714170/41187395/15_de+brauw_2019+rdr+background+paper.pdf/8a67f25f-749f-be91-f90f-beed3d524364 (access: 30.08.2020).

Denzin, N. y Lincoln, Y. (2013). *Strategies of Qualitative Inquiry*. New York: SAGE Publication Inc. 4 Edición.

Hernández, J. (2007). Juventudes rurales y migración. XXVI Congreso de la Asociación Latinoamericana de Sociología. Disponible en: https://www.aacademica.org/000-066/1771 (access: 16.01.2020).

Jurado, C. y Tobasura, I. (2012). Dilema de la juventud en territorios rurales de Colombia: ¿campo o ciudad? *Revista Latinoamericana de Ciencias Sociales, Niñez y Juventud*, 10(1), 63-77. Disponible en: http://www.scielo.org.co/pdf/rlcs/v10n1/v10n1a03.pdf (access: 21.08.2020).

Kessler, G. (2006). La investigación social sobre juventud rural en América Latina. Estado de la cuestión de un campo en conformación. *Revista Colombiana de Educación Universidad Pedagógica Nacional Bogotá*, Colombia, 51, 16–39.

Laureano, J., Mejía, M., Valadez Figueroa, I., Márquez Amezcua, J.M. (2014). Movilización social y determinantes sociales de la salud: proceso educativo en comunidad rural de Jalisco. *México Estudios Sociales*, 23(46) (2015), 138–161.

Mesen, R. (2013). Jóvenes y proyectos de vida de vida en tierra blanca. *Diálogos Textos Breves sobre desarrollo rural*, 109(2013). San José de Costa Rica. Disponible en: https://landportal.org/es/library/resources/ipdrs-di%C3%A1logos-109/j%C3%B3venes-y-proyectos-de-vida-en-tierra-blanca (access:10.11.2019).

Muñoz, G. (2015). De las culturas juveniles a las ciberculturas del siglo XXI. *Revista Educación y Ciudad*. Núm. 18(2010): Culturas juveniles del siglo XXI. Disponible en: https://revistas.idep.edu.co/index.php/educacion-y-ciudad/issue/view/18 (access: 17.09.2020).

Organización Panamericana de la Salud – OPS. Organización Mundial de la Salud – OMS (2020). Enfermedad por el Coronavirus(COVID-19). En línea: https://www.paho.org/es/tag/enfermedad-por-coronavirus-covid-19 (access: 23.09.2020).

Paisaje Cultural Cafetero (2020) (Colombia). Disponible en: https://es.unesco.org/creativity/story/paisaje-cultural-cafetero-colombia (access: 19.07.2020).

Pardo, R. (2017). Diagnóstico de la Juventud Rural en Colombia Grupos de Diálogo Rural, una estrategia de incidencia. En: Documento 227 Grupo de Trabajo. Inclusión Social y Desarrollo. Obtenido de Centro Latinoamericano para el Desarrollo Rural (Rimisp): 2017. Disponible en: https://rimisp.org/wpcontent/files_mf/1503000650Diagn%C3%B3sticodelajuventudruralenColombia.pdf (access: 11.05.2020).

Piñeros Lizarazo, R. y Junior, A.Th. (2016). Juventude rural e mobilidade territorial do trabalho no século XXI. *Pegada Eletrónica*, 17(2), 251-268. Disponible en: https://revista.fct.unesp.br/index.php/pegada/article/view/4726 (access: 15.09.2020).

Revista Portafolio (2020) (Colombia). El café vuelve a ser el motor de la economía. Disponible en: https://www.portafolio.co/economia/el-cafe-vuelve-a-ser-el-motor-de-la-539712 (access: 06.04.2019).

Suárez, L. (2006). Un nuevo actor migratorio: Jóvenes, rutas y ritos juveniles transnacionales. En: F. Checa y Olmos, A. Arjona y J.C. Checa Olmos (eds.). Menores tras la frontera. Otra inmigración que aguarda. Barcelona: Icaria.

Abstract

Rural youth and migration. Lessons learned in times of pandemic

This article presents a research analysis of some ways of understanding the migratory movements of rural youth in Caldas in times of pandemic. The fundamental thesis is that the global transformations, the environmental, economic and social trends of the quarantines decreed during the COVID-19 pandemic contribute to the resignification of young people's life in the countryside and rural territories in the department of Caldas (Colombia). The methodology used considered the narratives of rural youth as inputs into analyzing the trends of staying in the countryside or migrating, based on the changes that occurred in their areas, in the framework of the policies decreed as a result of the pandemic such as prolonged quarantines. The results show that rural youth are beginning to develop a new sense of living and staying in the countryside, addressing issues related to the changes in the populated centers closest to their rural areas and the new socio-economic and environmental dynamics of the countryside in the transit of the year 2020.

Keywords: rural youth, globalization, generational change, times of pandemic

Citizen electoral participation in Colombian sustainable development

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1. Introduction

Citizen participation, also known as public participation or civil society participation, involves all efforts aimed at including citizens in public decision-making. In general terms, it implies the need to create spaces to forge a citizenry that feels itself the owner of the public space, responsible for the success or failure of society, and that sees public authorities as its instrument and collaborator, and not as an obstacle. In this scheme, different groups and their varied and even opposing interests must be compatible, and it must be possible to reach a consensus that may not completely satisfy any of them, but nevertheless is acceptable to all (Montes de Oca, 1988).

Voting represents the main mechanism for citizen participation, which is why it is the state's role to assume the great responsibility for protecting, sponsoring, and promoting the right to vote, whereas citizens participate in shaping the control of political power (Registraduría nacional del Estado civil, 2020). It will therefore correspond to the legislator, on the one hand, to indicate the rules that develop and make it possible and on the other hand, to the electoral authorities to implement the media and organize the strategies that facilitate its effective exercise ensuring transparency and functionality.

By means of the vote or suffrage, citizens exercise the right recognized by the Constitution to participate in elections for the appointment of their representatives, or to vote on the proposals submitted to their consideration, such as plebiscites, referenda, popular consultations and revocations of the mandate (Suksi, 1993).

It is vital that society, both governing and governed, does not lose sight of the importance of citizen participation to legitimize our institutions, which have a representative character and will only be strengthened if they achieve the legitimacy of their governed through action, the action of participation (Alex-Assensoh, 2005).

The methodology used in the research, concerning the behaviour of people participating in electoral processes, public activities, and organisations, starts with five Probit models in which the Colombian regions are taken as

explained variables. The Bogotá variable takes the value of 1 if the region with the respondent's home is Bogotá, and 0 if it belongs to another country region. This works in the same way for the rest of the regions, that is, the Caribbean variable takes the value of 1 if the region where you live is the Caribbean region, and 0 if it belongs to another Colombian region. The main source is the Survey of Political Culture ECP-DANE (DANE, 2019), characterizing features of participation in community sceneries, based on the perceptions and practices of citizens of their political and social environment. For this, the population considered is the one that is equal to or over 18 years old.

The expected results suggest that the higher the education, the less likely is the trust in congress and political parties. Regarding the stratum, an individual that belongs to a low stratum presents a probability of trusting in political parties and congress, but this probability decreases as the individual increases his socio-economic stratum. In relation to age, young people are less likely to trust the electoral system, while the matured population has a higher probability to trust Congress.

2. Theoretical background

2.1. Citizen participation

Citizen participation is defined as the activities that seek to transform the state, interacting with and before it, to influence the design, definition, and programming of public policies. They can be conceived from the legitimation and legalization of new positive rights, the establishment of mechanisms to organize democratic life, and the planning and execution of programs (Aguirre Sala, 2014).

This citizen participation in aspects related to local development difficulties, is determined as a key element because it provides evidence of the commitment level to a community ideal, an important ethical position that places the needs of the community as equal to or more important than the personal individual interest (Saul, 1995). This ethical perspective directs actions away from individual efforts, based on self-interest, towards collaborative action for the common good. As a church community worker suggests, the development of such a perspective moves away from assumptions that people essentially do things in their own interests towards an appreciation that individuals are willing to do something for someone else. A citizen understanding of the ethical basis in taking action for the common good provides a social foundation for building a sustainable local community (Redclift, 2005).

In order to get that citizen understanding, education for sustainability is a key component so as to facilitate community empowerment in the participatory development process (Redclift, 2005). This sustainability education must

develop critical thinking, reflection and action skills needed to make life-long decisions about the nature of a better world. Such a suggestion implicitly includes understanding of broader social, environmental, and economic issues. Additionally, it argues for a focus on developing awareness of causes of local development issues and education for political literacy and informed citizenship (Fien, 1995).

Thus, there must be a balance between the support of a social structure around an individual and own individual engagement and capability for freedom and creativity (Shor, 2012). In that way, collaborative action between local stakeholders will facilitate local development processes for a sustainable community. Nevertheless, a number of restrictions currently impedes any such collaboration. Public resources and greater citizen participation in decision-making demand a social change towards a more participatory democracy (Amalric, 1998). Requirements for such change are the inherent right and responsibility of citizens in a democracy (Saul, 1995).

Nevertheless, advances toward a more participatory democracy are not directed at control of power. They are aimed at building a compensatory power to create new common goods, rooted in interdependence and coexistence. The goal is not to replace one power with another power. This social change seeks to develop collaborative processes based on trust, cooperation and respect between citizens and local government (Amalric, 1998).

Equity issues impose an ethical responsibility on those who have the resources, skills, and knowledge to preserve or enhance efforts to help those most in need. Allowing citizens to act on these small local issues will require providing them with the skills, understanding, support and opportunities that allow them to participate in local development processes. Only then the foundation of sustainability will have a chance to take root and grow. The local administration seems to be well positioned to take on the role of facilitating this citizen participation through the development of community capacities (Cuthill, Fien, 2005).

In view of that, empirical questions about participation rest on a theoretical foundation that supports a conception of the democratic city in the good society. We assume that broader levels of participation are linked to greater responsiveness of city governments (Portney, Berry, 2010).

It is assumed that interrelated considerations of equity, resource distribution and power are not satisfactorily forwarded within the dominant theoretical and applied concepts of sustainable development (Redclift, 2005). The relationship between participation and sustainability is largely hushed with respect to the explicit logic or rationale why such a relationship should exist, surely arising from particular assumptions about political behaviour (Portney, Berry, 2010).

Participation can also be driven by high levels of education or wealth. Since socioeconomic status is so strongly correlated with participation, city policymaking may reflect this bias in participation. The rise of environmentalism

is largely linked to the changing nature of liberalism, with its greater focus on quality of life issues (Berry et al., 2002). One reasoning suggests that if a municipality is to develop and implement a sustainability initiative, it must do so with the trust and cooperation of its residents. It is not something that can just be orchestrated from above, even if some sustainability experts would like it (Brugmann, 1997). A second logic also supports the argument that participation must be associated with the search for sustainability. One of the most important threats to local sustainability is found in the variety of externalities that cities produce when trying to support the local economy and the lifestyles of their residents (Rees, Wackernagel, 2004). A third reasoning is based on the idea that when cities adopt Citizen Participation, programs designed to facilitate the direct participation of ordinary residents in the public policy-making process, widespread public support for sustainability and environmental protection could possibly provide power balance against antagonistic business interests to particular environmental proposals (O'Connell, 2009).

Of course, there are many reasons to suspect that participation could undermine the quest for sustainability. In other words, greater participation may not be related to the pursuit of sustainability, or it may even be associated with the absence or opposition to efforts to try to be more sustainable. People can participate because they are angry with the sustainability proposals or because they distrust their neighbours and worry about what their fellow citizens might think in the planning process (Groc, 2007).

These environmental pressure groups, supported by higher-income citizens, have been instrumental in driving sustainability. Effective mobilization efforts, through outreach either by the city or civic and environmental groups, can be successful in expanding participation beyond the usual suspects. This mobilization can be successful for a variety of reasons, and participants can bring opposing motivations and points of view to the process (Berry et al., 2002).

Throughout 2010-2020-decade, participatory democracy underwent its own secularization process. Nowadays, it is seen with a very healthy uncertainty and perhaps, in a more realistic way; it is possible to identify its advantages and limitations, understanding that its expansion is not upward and globalizing, but tied to cycles of social mobilization and presents uneven development in localities and regions (Jiménez, 2010b).

García et al. (2020) carried out a study on a sample of 384 people, taken from a total population of 558,815 (according to the 2016 DANE[1] statistics), through a questionnaire on citizen participation, made up of eight questions, which produced the results presented in Table 1.

[1] The National Administrative Department of Statistics -DANE- is the entity responsible for planning, collecting, processing, analysing, and disseminating of Colombia's official statistics.

Table 1. Motivation to intervene instances of participation

Question: What motivates you to intervene in instances of participation?	Stratum							
	Low	N	Medium-low	N	Medium-Medium	N	High	N
I like to serve the community	70%	32	63%	87	62%	117	75%	9
They are opportunities to negotiate with the municipal administration	4%	2	9%	13	13%	25	17%	2
I can obtain some personal of family benefit	9%	4	14%	19	15%	28		
By participating in these organizations, I gain prestige	6%	3	4%	5	1%	2		
Other	11%	5	10%	14	9%	16	8%	1
Total	100%	46	100%	138	100%	188	100%	12

Source: García et al. (2020, p. 145)

As it is evidenced in Table 1, the motivation for the participation of citizens in local development is relevant in periods where social realities present vast perspectives that demand immediate solutions, requiring union and solidarity, the self-managed work of the community to face the solutions raised from the social base. Citizen participation aspires to influence all kinds of decisions and actions that affect people, wherever they come from and wherever they occur. They are more mature and autonomous forms of participation, less dependent on the involvement of public authorities to get started and, therefore, also more emancipated from control implemented by government.

Table 2. Trust in political parties

Question: Do political parties and their leaders support citizen participation?	Stratum							
	Low	N	Medium-low	N	Medium-Medium	N	High	N
Yes	6%	3	20%	27	27%	50	17%	2
No	43%	20	32%	45	27%	51	41%	5
I do not know	50%	23	48%	66	46%	87	42%	5
Total	100%	46	100%	138	100%	188	100%	12

Source: García et al. (2020, p. 149)

Political parties are organizations attached to an ideology with the right to participate in political processes. According to the data in Table 2, the lack of knowledge on the role played by political parties is worrying. The lower stratum presents an index of 50%, decreasing as the stratum advances, but without ceasing to be alarming. The perception that there is no support from them for citizen participation represents 43% in the same stratum, the results that allow to think that abstention from voting or vulnerability in voting at the time is represented in the lower strata referring to participation in electoral processes and community activities.

Consequently, based on the results, it can be considered that the group does not have a clear voting discipline, experiences a loss of political control, does not understand the role of political parties, and does not want to get involved in collective activities guided by political parties who run public administration (García et al., 2020). According to the Latino barometer survey (1996–2011), political parties are systematically the institutions that Latin Americans trust the least (Welp, Marzuca, 2016).

2.2. Campaigns and participation

There is a widespread agreement that runs for election efforts, campaign news and media coverage foster turnout (Hogan, 2013). Intense campaigns increase the quantity of messages distributed to voters helping them to form opinions and playing a signalling role by alerting voters that something important is at stake. This leads voters to pay more attention to the campaign and to make more complex decisions about parties and candidates. By contrast, when intensity is low, information is sparse and citizens have fewer incentives to mobilize (Matsusaka 1995). Even if people consider voting as an obligation, rational citizens desist if they feel unable to evaluate the choices. Variations in turnout can be explained by variations of how informed citizens are (Goldberg et al., 2019).

2.3. Citizen participation in Colombia

In Colombia, citizen participation is an essentially regulated matter. In this sense, Constitutional Article 152-d. corroborates the foregoing and demands that said issue be assumed by the Congress of the Republic through Statutory Law, a normative typology that the constituent reserved for those matters that it considered essential for the State and society, which constitutes a serious indication of the importance that the constituent attributed to the mechanisms of citizen participation (Jiménez, 2010a). There are several mechanisms for citizen participation such as: the legislative and normative popular Initiative, the Referendum, the Popular Consultation, the Plebiscite, the Open Town Hall, Mandate recalling, among others.

2.4. Mandate recalling

Let us see a specific mechanism like Mandate recalling which is a vertical accountability mechanism that allows citizens to maintain control over elected leaders for most of their term of the post. It enables a number of voters dissatisfied with any representative to demand special elections in which they can remove him (Eberhardt, 2018). It was incorporated, along with other institutions of direct democracy, in various Latin American constitutions and laws, to a greater extent since the 1990s, in a context of crisis of representation.

The objective of these reforms was to open new institutional spaces for popular participation and control in public policy processes, in an attempt to recreate certain worn-out social and political consensus in the midst of a climate of loss of legitimacy of the leaders. Such devices are expected to incentivize elected officials to be accountable to citizens for their performance (Cronin, 2013) and to make citizens participate collectively and directly in the decision-making process and rather than electing their representatives making their own decisions (Payne et al., 2002).

Among the Latin American countries that included this tool in their national constitutions is Colombia, which incorporated it into its Fundamental Law in 1991, although only for the heads of the executive at the subnational level, excluding representatives of the legislative power of all spheres and the President. The 1991 Constitution promoted participatory democracy as a response to many problems that plagued Colombian democracy (Welp, 2016).

2.5. Democracy and citizen participation

In today's society democracy has been established as the most accepted form of government in the world, and the one that best ensures the participation of the individuals that comprise it. Today, it is not only about governing, but also about granting a permeable economic and social organization applicable to the daily life of people. Thus, there are certain values, attitudes and behaviours that can be classified as democratic (Trapp, 2016).

The territorial entities in the different constitutional legislations have had a preponderant role. In the case of the autonomous municipal executive power, it also has important consequences for local politics. On the one hand, the executive can function as a coordinating body for municipal public action and enables a greater degree of efficiency than that found in non-decentralized municipal political models (Clarke, Gaile, 1989). On the other hand, the conception of the municipality, as an independent political entity, gives it great relevance for political parties and citizens (Blair, 1991), because the municipal sphere can become a true reflection of their electoral power and it is the place to which they channel a good part of their social demands.

In municipal political systems, as it occurs at the national level, electoral competition between parties that runs for periodic elections is the mechanism

that legitimizes access to political power, assuming that parties always seek a way to maximize votes to obtain power. To the extent that the municipal government controls both the mechanisms of local political power and resources, it can promote citizen participation in political decision-making in multiple ways (Downs, 1973). Another possible action is to promote the existence of local associations that represent the interests of citizens, providing these associations with quotas of power, subsidizing groups, offering them meeting places, giving them a voice in municipal decision-making bodies, among others (Yáñez, 1998).

Therefore, in order for the democratization game to play out, it is assumed that the government prefers, in the first place, to democratize the municipality, as long as it believes that the associations will not be against it. If a municipal government interested in opening channels for citizen participation acts rationally, when it is in a context of certainty, it will try not to promote it in an equitable way for local associations representing citizen interests, but will do so in a biased way, trying to favour the groups that support him. And if the context is one of uncertainty, democratization will only be rational if it is believed that the subjective probability of being faced with like-minded associations is large enough so that the benefit is greater than the cost of democratization (Aguiar, Navarro, 2000).

When citizens have the opportunity to express their political preferences through the ballot box, then the increase in educational levels, during the first stage of industrialization, can be expected to encourage electoral participation, in addition to promoting other broader aspects of citizen participation, as the growth of partisan and union organizations in urban and industrial areas. However, we can expect a cap effect due to the impact of human development. In particular, once primary and secondary education become generalized among the population, and produce the basic cognitive skills that facilitate citizen awareness and access to the mass media in industrial societies, then the greatest advances in the proportion of the population that attends universities and the constantly growing levels of personal wealth, income and leisure time in post-industrial societies do not produce major increases in voter turnout (Norris, 2002).

Corresponding to that, trust in electoral processes is often a necessary condition for trust in other institutions of democracy. Several studies have shown that where citizens are convinced that elections in their respective countries are not clean, voter turnout tends to decrease (Zovatto, Payne, 2003), and in the most extreme cases, popular protests of various kinds may occur (Thompson, Kuntz, 2004). In new democracies, especially in Latin America, one of the solutions to ensure open, clean and fair electoral processes and to generate and increase confidence in elections, has been the creation of independent Electoral Bodies as arbiters of electoral contests. These have played an essential role in the democratization processes, especially in the transition phase, and since elections are the prerequisite of democracy, the character, competence and composition of the electoral bodies can determine whether an election is the origin of a peaceful change or the cause of serious instability (Pastor, 1999).

2.6. Citizen participation and sustainable development

If the current ecological crisis has a social origin, the achievement of sustainable development is also a common task that implies the participation of all citizens. But communities are not homogeneous entities; they are made up of different types of actors, who occupy disparate positions in the social structure and who defend conflicting interests. In practical terms, it is possible to distinguish various types of actors with positions, responsibilities, competencies and capacities for diverse change with a view to achieving sustainable development (Mihanyar et al., 2016).

Citizens need to be encouraged to participate definitively, which means that an "interest" is required. This implies an ideology that causes that a group of citizens come together in order to solve a problem common to them. A public good that is in the interest of one group in a society need not necessarily benefit society as a whole (Olson, 1992). A change of attitude in society (community and government) that includes responsibility, the desire for a common welfare, and the desire to contribute to achieve it is needed. Motivating people to participate in the decision-making process of their community can be quite a difficult task, especially when decisions that affect their own lives have been made by others for a long time without the possibility of exerting any influence (Dobson, 2007).

Society must aim for a vast open debate in which the civil society and the state participate with their voices, which are expected to translate into actions of the state administration, that is, in public policies. Participation must be understood as a legitimate right of the citizens and their organizations to get involved and decide on the aspects that influence their development. In the 1993 Human Development Report, participation is defined as means by which people intervene closely in the economic, social, cultural, and political processes that affect their lives. As a result, participation is an essential element of development (Hart, 2013).

3. Study area and methods

3.1. Study area

The research object is the citizen electoral participation in Colombia and the relation with sustainable development (Jiménez, 2010a; Portney, Berry, 2010). The information about citizen electoral participation in Colombia was obtained from The Political Culture Survey, which permits to recognize what kind of collective and solidarity activities are done by Colombians (what opinion they have of the forms of people's participation, and what considerations they have about participation).

In addition, it lets to distinguish the behaviour of people in the elections and their perception of the following points: the participation of the

population in different stages of popular election; estimation of the citizenship regarding the democratic system of the country; access to facilities provided by the public entities and the relationships of support; and trust established between people and the institutions that allow contributing the determinants to evolve towards a modern society with institutional effectiveness and peaceful coexistence.

The Political Culture survey investigates the perception that Colombian citizens have of their political environment. It explores knowledge regarding the concept of democracy, the mechanisms and spaces for citizen participation and the perception of utility that these represent. Issues related to electoral behaviour, perception of political parties and trust in institutions are also explored.

This Political Culture survey seeks to generate strategic statistical information that allows characterizing aspects of Colombian political culture, accumulation of social capital, participation in community settings and trust, based on the perceptions and practices of citizens concerning their political and social environment, as input to design public policies aimed at strengthening democracy and peaceful Colombian coexistence (DANE, 2019).

Participation has comparative advantages, since its non-use entails opportunity costs and also produces the generation of direct costs that will affect the fulfilment of the goals of the programs. These direct costs have been identified by the World Bank, among others (Guillen et al., 2017):

- Lack of support and sense of ownership that prevents the use of services.
- Reduces continuity of profit and limits recovery of project costs.
- Sense of indifference and dependence on the State.
- Upset and resentment when projects are imposed.
- Risk of compounding differences.
- Conflicts between different interest groups opposed.
- Generation of expectations impossible to meet.
- Powerful elites produce the exclusion of the weakest.

Citizen participation has a great impact on sustainable development, given that through the former, the regulation and intervention processes of public powers can be simplified, and decision-making can be facilitated by the rest of the social agents especially economic and environmental (Farinós i Dasí, 2008).

3.2. Methods

To try to explain the probability of electoral participation in the regions of Colombia, the Survey of Political Culture ECP of the year 2019 of the National Administrative Department of Statistics DANE was used, taking as a reference people over 18 years old. The purpose of the database is to characterize, in a social environment, different aspects of perception related to the community context and trust in the political and social sphere.

To explain what has been raised, five Probit models are developed, in which the regions of Colombia are taken as explained variables. The Bogotá variable takes the value of 1, if the region where the respondent's home corresponds is Bogotá, and 0, if it belongs to another region of the country. This works in the same way for the rest of the regions, that is, the Caribbean variable takes the value of 1, if the region where you live is the Caribbean region, and 0, if it belongs to another region of Colombia. The independent variables for each model are described in Table 3. The proposed Probit model is specified in a general way as follows:

$$P(Y=1 \vee x) = F(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_n x_n)$$

The F function reaches values that are strictly between zero and one, 0 <F (z) <1, that is, the vectors of the variables, defined as Xn, are known as independent variables, and are explained in Table 3.

Table 3. List of explanatory variables

General characteristics	Type of variable
Education	Continuous, measured in years.
Rural	Binary, (1) lives a dispersed population and / or rural centre
Low Stratum	Binary, (1) if it is from stratum 1 or 2.
Middle Stratum	Binary, (1) if it is from stratum 3.
Age	Continuous, measured in years.
Man	Binary, (1) is man.
Vote	Binary, (1) voted in the 2018 presidential election.
Trust in Congress	Binary, (1) if you trust or trust the Congress of the Republic a lot.
Trust in parties	Binary, (1) if you trust or trust the political parties a lot.

Source: own elaboration

Once the model is defined, the estimates are made for each of the regions of Colombia. Table 4 shows the marginal effects of each model defined for the year 2019.

In general terms, the forecast carried out by each model is not homogeneous for all regions. For the case of Bogotá, the model performs a correct forecast of 82.35% for the case of Bogotá, and 71.14% for the Pacific region. The set of variables chosen explain 5.57% the variations of the dependent variable for Bogotá, while for the case of the Eastern region, this explanation is reduced to 0.48%.

The Probit model is a non-linear econometric model that is used when the dependent variable is binary or dummy, that is, it can only take two values.

Table 4. Results of model estimation

Characteristics	Bogotá	Central	Caribe	Eastern	Pacific
Education	0.0019***	-0.0024***	0.0026***	-0.0002	-0.0023***
	(4.44)	(-5.63)	(5.98)	(-0.60)	(-4.59)
Rural	Omitted	0.0447***	-0.0479***	0.0426***	0.1090***
		(9.47)	(-10.74)	(8.75)	(19.53)
Low Stratum	-0.1821***	-0.0173**	-0.0156**	-0.0009	0.1499***
	(-21.45)	(-2.68)	(-2.34)	(-0.14)	(21.52)
Middle Stratum	0.0027	-0.0200**	0.1195***	0.0633***	0.0341***
	(0.36)	(-2.73)	(-19.82)	(7.19)	(3.29)
Age	-0.0003**	0.0003***	-0.0006***	-0.0001	0.0005***
	(-2.52)	(3.47)	(-5.44)	(-1.17)	4.18
Man	0.0109**	-0.0072**	0.0041	0.0048	-0.0105***
	(2.54)	-1.89	(1.03)	(1.24)	(-2.33)
Vote	-0.0285***	-0.0210***	0.0030	0.0051	0.0343***
	(-5.33)	(-4.54)	(-0.63)	(1.11)	(6.56)
Trust in Congress	-0.0325***	0.0149**	0.0354***	0.0204**	-0.0490***
	(-4.79)	(2.37)	(5.19)	(3.10)	(-6.96)
Trust in parties	-0.0506***	0.0311***	0.0315***	-0.0052	-0.0243
	(-7.00)	(4.19)	(4.08)	(-0.73)	(-2.93)
Constant	-0.399***	-0.858***	-0.6475***	-0.951***	-1.088***
	(-9.58)	-24.40	(-18.94)	(-26.96)	(-31.94)
R2	5.57%	0.68%	1,61%	0.48%	3.00%
Correct classification	82.35%	81.90%	79.33%	80.82%	71.14%

Note: *** Significant at 1%, ** Significant at 5%, * Significant at 10%.

Source: Own calculations with Stata 14

The simplest model of binary choice is the linear probability model. However, there are two problems with using it:

- The probabilities obtained can be less than zero or greater than one.
- The partial effect always remains constant.

To overcome these disadvantages, the Probit model was designed, which uses a function that only assumes values between zero and one. These functions

are not linear and correspond to the cumulative distribution functions. In the Probit model, the probability of success is evaluated in the function G (z) = Φ (z) where:

$$P(y=1\,|\,x)=\Phi(\beta_0+\beta_1x_1+...+\beta_kx_k)$$
$$\Phi(z)=\int_{-\infty}^{z}\left(\frac{1}{2\pi}\right)^{1/2}exp\left\{\frac{-u^2}{2}\right\}du$$

This the standard normal cumulative distribution function. For example, with this function and these parameters we would obtain a value of:

$$\beta_0=3,\ \beta_1=-1.8,\ x=1$$
$$P(y=1\,|\,x=1)=\Phi(3-1.8\times1)=\Phi(1.2)=0.88$$

To calculate the partial effect, each variable x must be replaced by a specific value. Frequently the sample average of the variables is used. The method for estimating Probit is that of nonlinear least squares. The nonlinear least squares estimator selects the values of that minimize the sum of squared residuals.

$$\min_{\beta_0,...,\beta_k}\sum_{i=1}^{n}[y_i-G(\beta_0+\beta_1x_{1i}+...+\beta_kx_{ki})]^2$$

In large samples, the nonlinear least squares estimator is consistent, normally distributed, and generally less efficient than maximum likelihood. As indicated at the beginning, the problems of the linear probability model are twofold:

- The probabilities obtained may be less than zero or greater than one,
- The partial effect always remains constant.

The logit and Probit models solve both problems: the values (representing probabilities) will always be between [0,1], and the partial effect will change depending on the parameters. Thus, the probability that people are involved in a formal job will be different if they have just graduated or have 15 years of experience.

The Probit model has been used in several studies, for example, in measuring poverty in Monteria, Colombia (Narváez et al., 2016). The relationship between different socioeconomic variables and monetary poverty, in this city in 2012, could be properly studied by taking a look at similar works through a binomial regression analysis in which the dependent variable (Poor household) takes only two only dos values (1 for monetary poverty and 0 for non-monetary poverty). To prove the statement given above, a model Probit was estimated which belongs to the type of qualitative response models including cross-section information coming from surveys about life quality. Results showed the characteristics of households in the city of Monteria which were prone to be poverty-stricken.

4. Results

If an individual is chosen at random and improves his education by one year, the individual is more likely to live in Bogotá or in the Caribbean region than in others. Given that, in the case of Bogotá, the database does not include data on rurality; there is a greater probability that the same individual lives in the urban area and is from the Caribbean region, compared to the other regions where there is a greater probability of living in a populated centre or in the dispersed rural area.

In relation to the economic status, if the individual belongs to a low stratum, such a person is much more likely to be from the Pacific region, and less likely to be from Bogotá. But if the individual belongs to the middle stratum, then she/he is less likely to be from the central region. If the individual increases his/her age by one year, then she/he is more likely to be from the Pacific and Central region. If the individual is a woman, she is much more likely to be from the Central or Pacific region.

Although it turns out not to be statistically significant, there is a greater probability of electoral participation, determined by the vote in the 2018 presidential elections, in the Caribbean, Eastern and Pacific region; if each one is compared to the other regions of Colombia, that is, in this case, the average years of education are not directly related to electoral participation, given that in Bogotá, which has the highest average of 6.54 years of education, there is no greater probability of electoral participation in the case of elections.

If the individual does not trust the Congress of the Republic, it is much more likely that she/he is from Bogotá or the Pacific region, while if she/he trusts the political parties it is more likely that he is from the Caribbean and Central Region.

For greater clarity, the marginal effects of the binary variables chosen for explaining the proposed model are calculated (see Table 5). In the case of strata, where there is a greater probability of belonging to the low stratum, the Pacific region has been identified in the general estimation of the model. The interesting thing here is that this probability is 22.99% higher than the probability presented in Bogotá, where the lowest probability of belonging to the low stratum is recorded. However, if the middle stratum is analysed, it follows the Pacific region where there is a greater probability of belonging to this group, whereas the least probability occurs in the Caribbean region. There are no significant differences in the probability of being male or female in each region, as it is to be expected.

For the central case of the study, in the Pacific region there is a greater probability of electoral participation. This indicates that if a person is chosen at random, there is a probability of 29.65% that this person has participated electorally in the presidential elections (the Pacific region), and 12.80% (Bogotá): these are the regions with the highest and lowest probability of electoral participation, respectively. After the Pacific region, individuals from

Table 5. Regionalization probability by category of variables

Variables	Categories	Probability				
		Bogotá	Central	Caribe	Oriental	Pacific
Low Stratum	Others	0.2122	0.1957	0.2146	0.1939	0.1839
	Low	0.0964	0.1760	0.2043	0.1909	0.3263
Middle Stratum	Others	0.1164	0.1865	0.2251	0.1834	0.2887
	Medio	0.1827	0.1546	0.1170	0.2333	0.2877
Man	Woman	0.1303	0.1836	0.2054	0.1889	0.2918
	Man	0.1337	0.1779	0.2081	0.1951	0.2848
Vote	Not vote	0.1445	0.1976	0.2083	0.1885	0.2637
	Vote	0.1280	0.1757	0.2061	0.1928	0.2965
Trust in Congress	Not trust	0.1356	0.1784	0.2012	0.1885	0.2955
	Trust	0.1084	0.1943	0.2354	0.2098	0.2501
Trust in Parties	Not trust	0.1357	0.1773	0.2029	0.1923	0.2912
	Trust	0.0983	0.2084	0.2340	0.1872	0.2668

Source: Author's elaboration

the Caribbean region, with 8.83% of difference, are those with the highest probability of electoral participation in Colombia.

In the case of trust in the Congress of the Republic of Colombia, which exercises constitutional and legal functions in order to generate development and the common good in Colombian society, there is a greater probability that an individual trusts it if she/he lives in the Pacific region (25.01%). If the individual lives in Bogotá, the probability of trust in the congress is reduced by 14.17%.

Among the regions, where the greatest and least probability of not trusting the congress are identified, the Pacific region and Bogotá continue to be the ones that present the highest and least proportion of non-trust, respectively. But if we talk about trust in political parties in Colombia, there is greater probability of trust in the Pacific region, followed by the Caribbean region and the central region.

5. Discussion

This article identified some determinants of the probability of belonging to a region of Colombia, focused on electoral participation for the 2018 period. Through a probability model, it has been determined that in Bogotá, which is

the region with the highest average education, there is the least probability of electoral participation.

In addition, the Pacific region, which has one of the lowest averages of education, 5.48 years, is where there is a greater probability of electoral participation in presidential elections, as this region has the highest probability of confidence in the congress and in the political parties. It indicates that in the regions where there is greater development, there is less probability of trusting the congress, the political parties and electoral participation.

There is a greater probability of electoral participation, determined by the vote in the 2018 presidential elections, in the Caribbean region and in the eastern region if each is compared to the other regions of Colombia. In other words, in this case, the average years of education are not directly related to electoral participation.

In these regions where poverty levels are high and education levels are low, anti-democratic phenomena such as vote buying occur. According to Cendales (2012), in developing countries, individuals prefer to sell their vote during elections, precisely because they do not perceive that their needs and desires are represented on the political platforms of the parties.

A voter prefers to obtain an advance payment for his vote in a voting market, rather than wait fruitlessly for the benefit of a public policy that will never be implemented. Voters sell their votes because they do not believe in the representation that a party makes of their needs and desires; they do not believe in the legislative exercise, in the design and execution of the political agenda that the governing party leads.

Participatory democracy is based on the idea of a self-governed community of citizens, who unite not because of a series of particular interests, not even because of altruism or natural goodness, but because of a civic responsibility that allows them to carry out mutual actions. This act of citizen participation would become the bridge needed to establish the ties between civil society and the state.

Participation can have multiple edges. Thus, it can be understood as a political process in which the citizen decides to have an activity within the game of power, it provokes the expression of opinions regarding the fundamental needs that afflict a certain community, population, or state, but with the purpose that such needs are contemplated in the government programs that are being implemented for this purpose.

The Summit of the Americas recognized the importance of citizen participation in environmental matters, where the concept of participatory development is handled and understood as a process by which interested parties exert influence and share control over development initiatives, decisions, and resources. The fundamental assumption is that only a committed and responsible citizenry, universally represented and actively participating, will be able to contribute to public decisions as authentic representation of national priorities.

Bibliography

Aguiar, F., Navarro, C.J., (2000). Democracia y participación ciudadana en los municipios: un mercado político de trastos. *Reis*, v. 91, 89–111.

Aguirre Sala, J.F. (2014). The potential of digital media in the face of traditional citizen participation and in the participatory budget. *Comunicación y sociedad*, 22(1), 211–229.

Alex-Assensoh, Y.M. (2005). *Democracy at risk: How political choices undermine citizen participation and what we can do about it*. Washington: Brookings Institution Press.

Amalric, F. (1998). *Collaboration between local Administrations and local communities in the Age of Globalization: The Example of Switzerland. Report from a work shop by The society for international [SID] and the institute for Federalism.* Murten: University of Fribourg.

Berry, J.M., Portney, K.E., & Thomson, K. (2002). *The rebirth of urban democracy*. Washington DC: Brookings Institution Press.

Blair, P. (1991). *Trends in local autonomy and democracy: Reflections from a European perspective. Local government in Europe*. London: Palgrave, pp. 41–57.

Brugmann, J. (1997). Sustainability indicators revisited: getting from political objectives to performance outcomes-a response to Graham Pinfield. *Local Environment,* 2(3), 299–302.

Cendales, A. (2012). Son los pobres las únicas víctimas con la compra de votos? Un caso de competencia política con expropiación generalizada, *Cuadernos de Economía*, 31(56), 273–300.

Clarke, S.E. and Gaile, G.L. (1989). Moving toward entrepreneurial economic development policies: Opportunities and barriers, *Policy Studies Journal*, 17(3), 574–598.

Cronin, T.E. (2013). *Direct democracy: The politics of initiative, referendum, and recall*. Boston: Harvard University Press.

Cuthill, M. and Fien J. (2005). Capacity building: Facilitating citizen participation in local governance. Australian journal of public administration, 64(4), 63–80.

DANE (2019). Encuesta de Cultura Política 2019. Departamento Administrativo Nacional de Estadística, Bogotá, Colombia.

Dobson, A. (2007). Environmental citizenship: towards sustainable development. *Sustainable Development*, 15(5), 276–285.

Downs, A. (1973). *Teoría económica de la democracia*. Madrid: Aguilar. Duverger, M. (1957), Los partidos políticos.

Eberhardt, M.L. (2018). The recall in Colombia: Institutional design and results of its application. *Revista de Derecho Politico*, 103, 209–229.

Farinós i Dasí, J. (2008). Gobernanza territorial para el desarrollo sostenible: estado de la cuestión y agenda. *Boletín de la Asociación de Geógrafos Españoles*, 46, 11–32.

Fien J. (1995). Teaching for a sustainable world: the environmental and development education project for teacher education. *Environmental Education Research*, 1(1), 21–33.

García, C.M., Ramírez-Casallas, J.F. and Riveros, O.C.V. (2020). La participación ciudadana, factor asociado al desarrollo del turismo sostenible: caso ciudad de Ibagué (Colombia). *Anales de Geografía de la Universidad Complutense,* 40(1), 135–158.

Goldberg, A.C., Lanz, S. and Sciarini, P. (2019). Mobilizing different types of voters: The influence of campaign intensity on turnout in direct democratic votes. *Electoral Studies,* 57, 196–222.

Groc, I. (2007). Keep your footprint out of my backyard. *Planning*, 73(1), 32-35.

Guillen, A., Badii, M., Blanco, M. and Sáenz, K. (2017). La participación ciudadana en el contexto de desarrollo sustentable. *Innovaciones de Negocios,* 5(9), 131–146.

Hart, R.A. (2013). *Children's participation: The theory and practice of involving young citizens in community development and environmental care*. London: Routledge.

Hogan, R.E. (2013). Campaign Spending and Voter Participation in State Legislative Elections. *Social Science Quarterly*, 94(3), 840–864.
Jiménez, C.F.E. (2010a). Citizen participation in Colombia: reflections from the constitutional perspective and statutory regulations. *Estudios de Derecho*, 67(149), 61–86.
Jiménez, C.F.E. (2010b). La participación ciudadana en Colombia: reflexiones desde la perspectiva constitucional y la normatividad estatutaria. *Estudios de Derecho*, 67(149), 61–86.
Matsusaka, J.G. (1995). Explaining voter turnout patterns: An information theory. *Public choice*, 84(1-2), 91–117.
Mihanyar, P., Rahman, S.A. and Aminudin, N. (2016). Investigating the Effect of National Park Sustainability on National Park Behavioral Intention: Kinabalu National Park, *Procedia Economics and Finance*, 37, 284–291.
Montes de Oca, R. (1988). Participación Ciudadana, Derechos Políticos y Democracia en Bien Común y Gobierno. *México*, 4(45), 27–34.
Narváez, A.R.A., Parra, J.B., Valencia, L.C. and Rincón, I.B. (2016). Modelo Probit para la medición de la pobreza en Montería, Colombia. *Entelequia: Revista Interdisciplinar*, 19, 67–86.
Norris, P. (2002). *La participación ciudadana: México desde una perspectiva comparativa. Facultad de Gobierno John F. Kennedy*. Cambridge: Universidad de Harvard.
O'Connell, L. (2009). The impact of local supporters on smart growth policy adoption. *Journal of the American Planning Association*, 75(3), 281–291.
Olson, R.K. (1992). Integrating sustainable agriculture, ecology, and environmental policy. *Journal of Sustainable Agriculture*, 2(3), 1–7.
Pastor, R.A. (1999). The role of electoral administration in democratic transitions: Implications for policy and research. *Democratization*, 6(4), 1–27.
Payne, J.M., Florez, F.C. and Zavala, A.A. (2002). Democracies in development: politics and reform in Latin America (vol. 1). Washington DC: IDB.
Portney, K.E. and Berry, J.M. (2010). Participation and the pursuit of sustainability in US cities. *Urban Affairs Review*, 46(1), 119–139.
Redclift, M. (2005). Sustainable development (1987–2005): an oxymoron comes of age. *Sustainable Development*, 13(4), 212–227.
Rees, W.E., and Wackernagel, M. (2004). Ecological footprints and appropriated carrying capacity: measuring the natural capital requirements of the human economy. *Sustainability: Sustainability Indic*, 4, 151–181.
Registraduría nacional del Estado civil. (2020). *El voto*. Registraduría Nacional del Estado Civil. https://www.registraduria.gov.co/Elecciones/inf_votan.htm#:~:text=El%20voto%20representa%20el%20principal,y%20control%20del%20poder%20pol%C3%ADtico.
Saul, J.R. (1995). *The unconscious civilization*. House of Anansi.
Shor, I. (2012). *Empowering education: Critical teaching for social change*. Chicago: University of Chicago Press.
Suksi, M. (1993). *Bringing in the people: A comparison of constitutional forms and practices of the referendum*. The Netherlands: Martinus Nijhoff Publishers.
Thompson, M.R., and Kuntz, P. (2004). Stolen elections: the case of the Serbian October. *Journal of Democracy*, 15(4), 159–172.
Trapp, S.M. (2016). Participación ciudadana y accountability: Reflexiones sobre la experiencia comparada en Chile y Colombia. *Jurídicas*, 13(2), 100–113.
Welp, Y. (2016). Recall referendums in Peruvian municipalities: a political weapon for bad losers or an instrument of accountability? *Democratization*, 23(7), 1162–1179.
Welp, Y., and Marzuca, A. (2016). Presencia de partidos políticos y diputados en Internet en Argentina, Paraguay y Uruguay. *Perfiles latinoamericanos*, 24(47), 199–224.

Yáñez, C.J.N. (1998). El nuevo localismo: municipio y democracia en la sociedad global. Diputación de Córdoba.

Zovatto, D., and Payne, M. (2003). Trends in electoral participation in Latin America. *CSES Plenary Session*.

Abstract

Citizen electoral participation in Colombian sustainable development

Elections are crucial to democracy because they provide citizens with a way to show their public policy preferences, and a way to keep elected officials accountable for their performance. The word *citizen* has an intrinsically political meaning that involves a certain kind of relationship between the people and the government. Citizens have a set of rights and responsibilities, including the right to participate in decisions that affect the public welfare. Based on a methodology which stems from the Survey of Political Culture ECP-DANE (2019), using a Probit model, this study establishes a relation between social-demographic variables and electoral participation. The results illustrate how the influences that regions, age, and educational level have on electoral participation are important factors for the achievement of the welfare goals of the national community, citizen participation and the achievement of community and government objectives. As a result, this is an indispensable element in sustainable development.

Keywords: citizen participation, political parties, sustainable development, Colombia

(Dis)ordered bodies: gender and territorial planning in La Celia, Risaralda, Colombia

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Introduction

Gender is a field in which our bodies and our behaviour is negotiated in society; to talk about gender is to talk about how our bodies are discursively (Butler, 2007), technologically (Haraway, 1991) and prosthetically (Preciado, 2011) produced, and about the prime field in which power is exerted (Scott, 1996). It is also a factor that influences the way in which humans relate to the environments they dwell in and imagine; this has been analysed by Adams (2010), who describes how animal protein consumption and *gender* are intertwined; by Mortimer-Sandilands (2005), who explains how protected areas in the United States became places to cultivate the *hegemonic manliness* by doing heavy work – like chopping trees – and to be away from the "perversions" – such as gender dissidences – that were perceived to originate in the cities.

Moreover, Esquivel & Matija (n.d.) have described the male aversion to ecologism that adhere to a patriarchal view of the world as a way of defending their *masculinity*. Also, *gender* has been linked to differential impacts by environmental problems and development policies (Rico, 1998), and to colonialism (Lugones, 2008). Therefore, *gender analysis* is an essential tool and a historical debt of *territorial planning* in Colombia, conditions that are evidenced by *Development Plans* and *Territorial Ordering Plans,* which are unaware of the topics mentioned above and significantly reproduce re-victimizing discourses, as this text will try to illustrate.

If a body is a place, it should be considered as the first scale in which values and social expectations are inscribed (Ortiz, 2012). In other words, the body is the first scale of the territory – the first scale of the socially constructed space (Llanos-Hernández, 2010; Sosa, 2012). My aim in this writing is to elucidate how gender has modelled the territorial ordering policies of La Celia and how a group of women coffee growers has been able to make a place for them in the patriarchal context of coffeeculture by the means of associating.

A coffee-producing municipality in the western Andes

La Celia is located on the western side of Risaralda department. It rests on the eastern side of the western Andes in between 1200 and 2000 m.a.s.l. (CARDER, 2013, as cited in Rodríguez, 2017), near a biodiversity plentiful mountain known as Cerro Tatamá. At the end of 19th century, it began to be occupied by settlers that have been exploiting salt mines and indigenous tombs called "guacas", so a settling came to be around a saltwater flourishment and nearby a muleteers path (Rodríguez, 2017). Given its location nearby a rising fluvial port on the Cauca river – Sopinga, currently known as La Virginia municipality – and its location which would become the epicenter of coffee production in 20th century Colombia, coffee started taking root slowly until it became the main land cover in La Celia – ~40% of the land – (Ángel et al., 1988).

A second wave of settlers came around 1914 from Santuario and Apía, linked to the antioqueño culture and its values (Correa et al., 2016). This is an effect of the occupation process named *Antioqueño Colonization*, marked by the dissemination of people from the department of Antioquia looking for better conditions to live after the *War of the Thousand Days* (Ortiz et al., 2015). As they expanded all over other regions, they would clear the native forests and plant coffee and other crops in that terrain, as it is a profitable crop that allowed them their livelihood; this practice came to be known as *abrir monte* – clearing forest – and its effects can be seen in the painting Horizontes (Horizons), done in 1913 by Francisco Antonio Cano (Betancur, 2018). It also made of the axe – a symbol of antioqueño people, their tenacity and their will for development.

Antioqueño culture, coffee production and its influences on the territory

Coffee began expanding through Colombia into the Coffee Region alongside the families from Antioquia that were looking for land they could dwell in and profit from (Parsons, 1997; Vásquez, 2013). This also meant the expansion of what Gutiérrez de Pineda (2000) called the Antioqueño Cultural Complex, which represented them as tenacious, hard-working people that could endure the difficulties of colonising. Furthermore, they have also been represented as a people who comply with political conservatism, catholic doctrine and male-chauvinistic stances (Betancur, 2018; Gallego et al., 2017; Gutiérrez de Pineda, 2000, Ortiz et al., 2015; Vásquez, 2013).

Another aspect of that cultural group is the patriarchal hierarchical scale in which the *productive sphere* – commonly understood as "the economy" (Gibson-Graham, 2002) – is above the *reproductive* one – linked to social and biological reproduction, care, domestic labour and other tasks that sustain life (Franco, 2015). If we go back to the notion of body as a scale of territory, this acquires 2 senses. The first, in which bodies and their behaviour are regulated by what would be called the sexual division of labour, which assigns *reproductive*

labour as a *feminine* feature and binds women to domestic spaces. The second one in which transformed ecosystems – crops – are seen as more desirable than native ecosystems, often perceived as obstacles. For instance, one local word for undergrowth is "maleza", which means "bad herb/vegetation".

Not a lot of time have passed since coffee was strongly incorporated into local economy and since it was adopted as a cultural trait: even when the early coffee crop experiments date back to the beginning of the 20th century, they did not become prominent until the 70s and 80s. Coffee production has shaped families and gender roles (Cardona, 2017; Lombo, 2013; Rodríguez, 2017), architecture, means of transportation and infrastructure. Even the coffee guild – Colombian Coffee Growers Federation [CCGF] – has been called "a good substitute of state" (Bolívar, 2006, p. 86, as cited in Lombo, 2013, p. 29) as a result of their inversions in infrastructure and collective facilities, their international trading capabilities and even having their own bank.

Gender and the coffee guild

After the coffee crisis in the 1990s, the sector had to adjust its dynamics in order to maintain validity in the international market. One of the strategies is implementing policies linked to social and environmental justice into the coffee production chain, thus, promoting the emergence of special markets and seals such as fair-trade, green/organic production, denomination of origin and gender equity (Lombo, 2013).

Those policies are adopted by the CCGF in alignment with the ones from the International Coffee Organization and can be perceived as a functionalisation of social justice elements by the logic of market (Lombo, 2013). However, in the case of women the policies have materialized in the encouragement to form women *productive associations*, a common aspect of government's and CCGF's policies. We will go back to this later.

Models without texture

The policies' place of enunciation

For the research that supports this text, I analysed the five *Municipal Development Plans* between 2000 and 2019 (Alcaldía de La Celia, 2001, 2004, 2008, 2012b, 2016), as well as the *Territorial Ordering Scheme*, formulated in 1999 and revised in 2012 (Alcaldía de La Celia, 1999, 2012a). One of my first questions was "could the official voice be neutral in terms of gender?". This question is important because policies are speech acts that produce effects on the world and, under the legitimacy of the state, they replicate discourses of exclusion into the territory itself. Comprehending them is a way to reach healthier and sustainable territories.

One possible approach is to think how the policies represent different groups of people. Which groups exist? How do they exist? And, very important in this case, which groups are ignored? Regarding these documents, they categorize many groups as *vulnerable population* or *priority population*, namely women, children, elderly, and "LGBT people" or gender dissidences, adducing to a so-called fragility. Accordingly, those groups are also considered subjects to be intervened by the policies, being mentioned explicitly both in the diagnostic and proposals of the plans.

Regarding the absences, men are never mentioned as persons with needs, desires and vulnerabilities. They are only mentioned in a couple of diagnostic passages that state that "male-chauvinism does not allow men to be tolerant" (Alcaldía de La Celia, 2001, p. 9), while proposals preach tolerance to the different, to the Other. In the *Plans*, men are identified as the opposite of that *vulnerable Other* who is conceived as target population. Hence, it is safe to say that the policies partition the world from a *masculine* point of view; as McKinnon said, "the power of creating the world from the one's point of view is power in its masculine form" (as cited by Haraway, 1991, p. 239).

How policies represent women

In the policies, *gender* and *sex* are closely associated. To be a woman is to have a woman's biological body and to be conditioned to exert a previously designed role. The images that policies create are that of *vulnerable women*, *productive women*, and *reproductive women*; and they are not necessarily separate entities but rather closely woven.

At first glance, the *vulnerable women* emerge at the moment they are enunciated as *vulnerable population*. This statement keeps appearing in all documents in diagnoses and actions that consider them the focus population of the policies regarding a cultural matter that have multiple – male, female, non-binary – agents involved, as if women were the only sexed bodies imagined by society (Anzorena, 2017).

Likewise, the picture of *reproductive woman* appears when proposals regarding parenthood, biological reproduction, teenage pregnancy, among other issues, are exclusively directed at women, ratifying the notion that those are matters that only concern women, as Jiménez Montoya (2019) also found. The Plans often project a reproductive role in women: as caregivers, as housewives, as value reproducers – they are the pillar of the family as the family is the basis for society, say the policies.

Finally, the *productive woman* appears as a solution for the historical relegation of women "in social, cultural, political and economic areas" (Alcaldía de La Celia, 2008, p. 97). Even when the analysed documents consider that *reproductive sphere* is women's purpose, to create *productive women's associations* and *micro-enterprises* has been the aim shared by all the *Plans*. Those kinds of policies concur with the developmentalist nature of the *Plans* and their

competitiveness and economistic fixations, thus, linking the idea of welfare with economic growth and money.

As a result of the tension between the representations of women and the lack of compromise on addressing the roots of gender inequity, some problems are created. First, they encourage women to engage in productive roles without redistributing reproductive work, so they end up assuming both, which could diminish free time and produce burnout and physical attrition. Second, the axiom behind the *associativity policies* that says "women are disordered/unorganised" (Alcaldía de La Celia, 2008, p. 97) re-victimises women, as it makes them responsible for gender inequity. And third, the usage of *gender* as a facade for ineffective action, as their actions do not focus on the root problems nor the *Plans* use appropriate indicators to evaluate the policies' effects or to diagnose the situation.

Being a woman coffee grower

Women from AMCECAFE are one example of the implementation of associativity policies, but they are also examples of how education influences their will to partake in public and productive spheres and their intention to *break paradigms*. Not only did they have the idea of associating while participating in a coffee tasting course, but some of them highlight the role of rural education too, as it instilled the will to lead their own coffee farms and productive initiatives.

While those policies never intended the redistribution of domestic and care labour, associating allowed them to access courses about diverse topics such as entrepreneurship, projects formulation, accounting and gender equity. This, they tell, have allowed them to dream about their future and to follow their own projects, transgressing the social mandate of *being-for-others* and begin to *be-for-themselves* (Ferrer & Bosch, 2013). As coffee growers, this meant expanding their occupations to all stages in the coffee crop, beyond activities that require fine movements such as picking. Also, it had an impact on their families and partners, especially when their spouses also joined the activities and conferences regarding gender equity.

It should be noted that the women of AMCECAFE see themselves as *feminine* too. They conceive *femininity* as a quality that is linked to their bodies, but that also consolidates with their actions. *Femininity*, in their words, is a texture; it is to be patient, soft, careful, to be delicate when talking, sitting and acting. Nonetheless, they also want to be recognised as gifted, strong, decided and rebel women; they want to be recognised as successful coffee entrepreneurs and not "just those farmers over there [alluding to rural margination prejudices]", detaching from the policies' representation as fragile and *vulnerable*. Also, they make a tactical usage of the policies to make their way into fulfilling *their own* dreams because they can have access to financing, technical and formative aids more easily when they are associated.

Finally, there is also a tension between *rurality* and *femininity*. Since *rurality* often means doing hard work, people often have to project themselves as strong people, capable of physically demanding labour like gathering coffee on high-pendants and driving on the unpaved roads through the rugged mountains.

Bibliography

Adams, C.J. (2010). *The Sexual Politics of Meat: A Feminist-Vegetarian Critical Theory* (20th anniversary). The Continuum International Publishing Group.

Alcaldía de La Celia. (1999). *Esquema de Ordenamiento Territorial*.

Alcaldía de La Celia. (2001). *Plan de Desarrollo 2001–2003: Por La Celia comunitaria, unida y solidaria [Proyecto de Acuerdo 003/2001]*.

Alcaldía de La Celia. (2004). *Plan de Desarrollo de La Celia 2004–2007*.

Alcaldía de La Celia. (2008). *Plan de Desarrollo Municipal 2008–2011: Por la unidad y el progreso de La Celia*.

Alcaldía de La Celia. (2012a). *Modificación excepcional de norma urbanística al Acuerdo municipal No. 009 de 2000, mediante el cual se adopta el Esquema de Ordenamiento Territorial del Municipio de La Celia Risaralda [Acuerdo 002/2012]*.

Alcaldía de La Celia. (2012b). *Plan de Desarrollo 2012–2015: Por una Celia próspera y productiva [Acuerdo 003/2012]*.

Alcaldía de La Celia. (2016). *Plan de Desarrollo 2016–2019: Construyendo confianza por una Celia mejor*.

Ángel, H., Londoño, W., Castaño, G., & Cardona, A. (1988). *Atlas de Risaralda*. Gobernación de Risaralda.

Anzorena, C. (2017). Lecturas feministas para el análisis teórico y empírico de las políticas públicas. In: M. Alvarado & A. de Oto (eds.), *Metodologías en contexto: Intervenciones en perspectiva feminista/poscolonial/latinoamericana* (pp. 63–82). CLACSO.

Betancur, J.C. (2018). Género, ambiente y desarrollo: Una visión integradora a la Colonización Antioqueña. *Ciencia Nueva. Revista de Historia y Política*, *2*(2). Doi.org/10.22517/issn.2539-2662.

Butler, J. (2007). *El género en disputa. El feminismo y la subversión de la identidad* (M.A. Muñoz, Trans.). Barcelona: Paidós.

Cardona, C. (2017). *Análisis de la equidad de género en el sector de café en Colombia. Voces de cafeteros hombres y mujeres y sus organizaciones*. Retrieved from: https://www.solidaridadsouthamerica.org/es/publications/an%C3%A1lisis-de-la-equidad-de-g%C3%A9nero-en-el-sector-de-caf%C3%A9-en-colombia (access: 4.05.20210).

Correa, J.J., Gil, A.P., Tascón, J.A., López, E.M., & Valencia, M. (2016). *50/60: Una historia compartida. Investigación 50 años de Risaralda y 60 años de Comfamiliar. Mapa histórico cultural*. Bogota: Editorial Planeta.

Esquivel, G.S., & Matija, M. (n.d.). *Womansplaining. El derrumbe de la civilización* (No. 2–05). Retrieved from: https://soundcloud.com/cerosetenta-1/womansplaining-t2-e5-el-derrumbe-de-la-civilizacion (access: 21.12.2020).

Ferrer, V., & Bosch, E. (2013). Del amor romántico a la violencia de género. Para una coeducación emocional en la agenda educativa. *Profesorado. Revista de Currículum y Formación de Profesorado*, 17(1), 105–122.

Franco, S.M. (2015). *Trabajo de cuidados: Debates y conceptualizaciones*. Manizáles: Editorial Universidad de Caldas.

Gallego, G., Jaramillo, C.P., Uribe, J., & Vasco, J.F. (2017). *Develar la diversidad familiar. Parejas del mismo sexo en el Eje Cafetero Colombiano* (1st ed.). Manizáles: Universidad de Caldas.

Gibson-Graham, J.K. (2002). Intervenciones posestructurales. *Revista Colombiana de Antropología*, *38*(enero-diciembre), 261–286.

Gutiérrez de Pineda, V. (2000). *Familia y cultura en Colombia* (5th ed.). Medellín: Editorial Universidad de Antioquia.

Haraway, D.J. (1991). *Ciencia, cyborgs y mujeres. La reinvención de la naturaleza*. Madrid: Ediciones Cátedra.

Jiménez Montoya, D.A. (2019). *Políticas públicas municipales y mujeres indígenas en el municipio de Puerto Carreño, Colombia: un análisis del período 2008–2015* [Master's thesis, FLACSO].

Llanos-Hernández, L. (2010). Concepto de territorio y las investigaciones en las ciencias sociales. *Agricultura, Sociedad y Desarrollo*, *7*(3), 207–220.

Lombo, E.M. (2013). *Institucionalización del género: Políticas públicas, escalas sociales y representaciones sobre mujeres cafeteras. Estudio de caso en El Colegio, Cundinamarca* [Tesis de Maestría]. Bogota: Universidad Nacional de Colombia.

Lugones, M. (2008). Colonialidad y Género. *Tabula Rasa*, *9*(jul-dic), 73–102.

Mortimer-Sandilands, C. (2005). Unnatural Passions?: Notes Toward a Queer Ecology. *Invisible Culture*, *9*(9), 1–22.

Ortiz, A. (2012). Cuerpo, emociones y lugar: Aproximaciones teóricas y metodológicas desde la Geografía. *Geographicalia*, *62*, 115–131. https://doi.org/10.26754/ojs_geoph/geoph.201262850.

Ortiz, L.J., González, L.M., & Almario, Ó. (2015). *Caldas, una región antigua y nueva, tradicional y moderna, local y nacional. Hacia un nuevo siglo XIX del noroccidente colombiano. Balance bibliográfico de Antioquia, Caldas y Chocó. Tomo 2*. Bogota: Universidad Nacional de Colombia.

Parsons, J.J. (1997). *La colonización antioqueña en el occidente de Colombia*. Bogota: El Áncora Editores.

Preciado, B. (2011). *Manifiesto contrasexual*. Barcelona: Anagrama.

Rico, M.N. (1998). Género, medio ambiente y sustentabilidad del desarrollo. In: *Serie Mujer y Desarrollo, ONU* (ONU). http://repositorio.cepal.org/handle/11362/16791.

Rodríguez, D.M. (2017). *Hacer espacios en patrimonialización. Prácticas cotidianas en la formación del 'Paisaje Cultural Cafetero' de Colombia – Patrimonio Mundial* [Doctoral thesis, Universitat de València]. http://roderic.uv.es/handle/10550/63723.

Scott, J. (1996). El género: Una categoría útil para el análisis histórico. In: M. Lamas (ed.), *El género: La construcción cultural de la diferencia sexual* (pp. 265–302). San Ángel: MÁPorrua.

Sosa, M. (2012). *¿Como entender el territorio?* Guatemala: Universidad Rafael Landivar – Editorial Cara Parens.

Vásquez, C.A. (2013). Los imaginarios de la colonización antioqueña desde 1860 hasta 1930 en la zona del Eje Cafetero: Una visión antropológica. *Revista de Educación & Pensamiento*, *20*, 7–29.

Abstract

(Dis)ordered bodies: gender and territorial planning in La Celia, Risaralda, Colombia

To question the relationships between body, gender and territory is essential to comprehend the territorialization processes. These have been studied from diverse points of view, counting the Feminist Geography among them, which has underlined the relevance of *gender* as a category that allows to explain the territory in function of problems, necessities, inequality's origins and ways in which places are inhabited. Many international policies have raised questions about this topic, such as the 2030 Agenda for Sustainable Development in its 5th Development Objective and other national policies and plans.

Nevertheless, the territorial ordering policies in Colombia have not questioned a heteronormative and patriarchal model of dwelling in the world, which is evidenced in the existence of *Territorial Ordering* and *Development Plans* that do not include gender analysis and thus ignore or even aggravate *gender* associated problems by replicating exclusionary and victimising viewpoints. Therefore, this document questions how women have been represented in territorial ordering policies in La Celia between 1999 and 2019, as well as their practical reflection in a local coffee grower women's association.

The data allow to explain how, amidst the male perspective of the municipal policies and the usage of the term *gender* to designate a vulnerable *other*, the women from Celianese Coffee Grower Women's Association [AMCECAFE] try to subvert femininity stereotypes and boost their entrepreneurship in coffee growing. Furthermore, they make evident how for them femininity is a field in tension that defies the models of *vulnerable woman*, *productive woman* and *reproductive woman* that the policies represent.

Keywords: women's associations, gender equity, public policies, sustainability, development

Citizens, territory and disaster risk: a complex relationship for participation in Colombia

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1. Background

1.1. Transformations in citizen participation

Social innovation as a phenomenon that characterizes the first years of the twenty first century in most countries, emerges particularly in cities, in spaces whose dynamics of coexistence makes it the "laboratorio de buena parte de las prácticas de innovación social" (laboratory of a good part of the practices of social innovation) (González, 2019), and manifests itself as a way of processing the conflicts that daily coexistence provokes.

Among this innovative social dynamics is administrative decentralization in Colombia, which emerges as a result of a process that dates to the 1960s (Giraldo, 2005), whose stage of maturity was characterized, among other elements, by the transfer of political power, with the popular election of local authorities in the 1980s in a framework of territorial autonomy accompanied by mechanisms for citizen participation that gave the communities strong citizen power for dialogue and decision making.

At the time, citizens knew their right to participate in public affairs, but perhaps they did not understand the meaning and scope of this transition from being a governed subject to the will of power of the elected by democratic vote, to being co-governors through participation in the affairs that affect the communities contained in the preamble and pillars of the 1991 Political Constitution.

A few more years were needed to issue the norms that gave clarity to the panorama of action and put the forms of citizen expression into effect.

In the midst of the fear of possible repressive reactions by public servants, instruments such as the right of petition and town meetings are gradually being positioned and strengthened; almost simultaneously, institutions such

as the Citizen oversight bodies are emerging, while other participatory forms such as constitutional justice for fundamental rights and environmental justice for collective rights are being pursued through the judicial system.

The political legacy of the end of the 20th century, two hundred years after the independence revolutions, gained strength with the institutionalization of the Public Hearings (Law, 489, 1998; Chapter VIII) and the Prior Consultation (C-169-ILO, 1989; Article 7). Both figures were strengthened in the first decade of the 21st century when the instruments of the right of access to environmental justice (Valencia Hernandez, 2014) empower native and Afro-descendant communities to make the recognition of the Prior Consultation effective as a determining mechanism for participation in decision making regarding extractive activities developed in their territories.

An example of the transformation and progress of citizen participation can be seen in the formation of citizen oversight bodies, which have become the participation benchmark with the greatest impact on the execution of public resources. The Single Business Registry (RUE in Spanish), kept by the Chambers of Commerce shows that up to 2020 274 oversight offices have been formed in Caldas, 1353 in Antioquia, 641 in Boyacá, 518 in Nariño, 476 in Bogotá, 342 in Risaralda, 295 in Santander and 223 in Meta (RUE, 2020).

Although according to this registry, the other departments are below the 200 registered citizen oversight bodies, the country has more than 5330 citizen oversight bodies distributed throughout the territory and only Caquetá, Guainía, Vaupés, Vichada lack these organizations.

1.2. International instruments for social participation in the territory

The participation of citizens in the construction of their territory has been legitimized since the Stockholm Declaration on the Human Environment, when it was foreseen that an imperative goal for humanity is "The defense and improvement of the human environment for present and future generations, and to achieve this goal it would be necessary that citizens and communities, (...) at all levels, accept their responsibilities and that all of them participate equitably in the common work". (Naciones Unidas, 1973).

A little clearer and more developed than this justification on which the 1972 Declaration was based, citizen participation re-emerged in 1992 on the occasion of the Rio de Janeiro Summit Declaration on Sustainable Development, where principle 10 states. "Environmental issues are best handled with the participation of all concerned citizens, at the appropriate level" (Naciones Unidas, 1993).

The incorporation of this principle into an international instrument is a pioneering initiative in that it was aimed at making community participation in public affairs effective, for which it pointed to the need to guarantee three related rights that serve as its pillars: access to information, citizen participation in government decisions, and access to environmental justice.

For the Organization for Economic Co-operation and Development (Organización Para la Cooperación y El Desarrollo Económicos OCDE), it is important to "strengthen the relationship between government and citizens", providing a space within which "the right of citizens to be informed, consulted and encouraged to participate actively, the public policies adopted and the institutions that are responsible for the corresponding tasks. It also includes the evaluation of activities and the general capacities necessary for their implementation" (OCDE, 2006).

Progressively, the political rights of communities have gone beyond the simple exercise of the vote to empowering citizens capable of becoming involved and participating in the construction of the state. In the local instances of the territory, all inhabitants have the right to intervene in the definition of their future through the construction of a vision of the territory that is desired and for which one must begin with the effective management of the land, the construction of the path to achieve this vision of proposed development and in contributing to the governance so that all inhabitants are circumscribed to the collective purpose of the future.

The Aarhus Convention, signed in this Danish town on June 28, 1998, with the aim of contributing to the protection of the individual right of every person to health and well-being, committed the subscribing parties to guarantee "the rights of access to information on the environment, public participation in decision-making and access to justice in environmental matters". (Aarhus, 1998).

This instrument is articulated in 2010 with the guidelines for the development of national legislation on access to information, public participation and access to justice in environmental matters, formulated by the United Nations Environment Programme (UNEP), but it only applies to the states that signed it, mostly from the European continent and Western Asia.

The Declaration on the Application of Principle 10 of the Rio Declaration on Environment and Development in Latin America and the Caribbean, issued in June 2012 by ten countries (FUNDEPS, 2018) within the framework of the United Nations Conference on Sustainable Development Rio + 20, structures the first precedent of the path towards environmental democracy in the region.

In accordance with the Declaration, the signatories committed themselves to a Plan of Action to which twenty four countries adhered. On March 4, 2018, they met in Escazú, Costa Rica, and signed the Regional Agreement on Access to Information, Public Participation and Access to Justice in Environmental Matters in Latin America and the Caribbean, a territory where the promotion and exercise of participatory instruments has been difficult.

In that area, this Agreement has been vital in the adoption of measures to guarantee and protect participation insofar as it touches on three priority points to stop violence against social leaders: a) "Overcome stigmatization, recognize the role of defenders and guarantee an appropriate environment for them to carry out their work; b) Protect their rights; and c) Adopt measures to prevent attacks against them" (Gomez, 2018).

The Escazú Agreement constitutes a binding international instrument for the parties, who in compliance with their commitments must promote citizen participation in their territories, facilitate access to information, and provide mechanisms that stimulate access to environmental justice, with an additional commitment that fits the Colombian reality following the Peace Accords. The protection of social leaders who empower citizen participation is also guaranteed.

For Valencia Hernandez (2020), the Escazú Agreement constitutes a very significant advance for environmental justice in the countries of Latin America and the Caribbean, since it reflects and gathers the lessons and experiences within the signatory countries in the application of Principle 10 of the Rio Declaration, in the national environmental legal frameworks, recognizing the diversity of interpretations, restrictions and practices. It also recognizes the increase in environmental conflicts in the region, the growing environmental and social awareness in the region, which has generated the need for a binding international legal instrument in Latin America and the Caribbean that institutionalizes access to justice in environmental matters, so that it is increasingly reinforced and guaranteed by the states.

1.3. Citizen innovation for democratic planning of safe territories

The alterations of the natural environment cause disaster when they affect the daily conditions of operation of human groups. Disaster risk management as an instrumented social process of which all people must be a part, must be approached from social innovation with adequate instrumentation, as it happened with the decentralization process towards the institutionalization of democracy.

If the disaster occurs where there are conditions of vulnerability for people, their goods, infrastructure, livelihoods and services or ecosystems are exposed, and although these occur as a manifestation of nature, it cannot be ruled out that they may also occur as a result of human activity. Therefore, the population must be a subject and an object of defined formative processes for the purposes of their participatory inclusion, beyond being taken into account in calls for socialization or sharing of pre-developed tools that seek to build resilience from the vision and thoughts of foreigners.

The guiding participatory principle of the National System of Disaster Risk Management establishes the duty of authorities to recognize, facilitate and promote community organization and participation. Community guides have been issued and processes and procedures have been designed for social, community and sector participation and organization in risk management. All of them as activities of a specific structure of authorities in the matter, but none as a vision of permanent articulation with the planning of the territory, originated in processes assorted from the community.

No instrument teaches or points out how the inhabitants of a territory can convene themselves, analyze themselves and organize themselves to manage their environment, especially when citizen participation barely emerges as a political right guaranteed by the international community in an environment where the exercise of social leadership is a high-risk activity.

The determining elements to build safe territories through planning requires forms of self-organization of the communities willing to participate, in an environment where the restrictions and personal risks of leadership are assumed with innovation and the authorities replace their strategy of conferences and videos advocating the benevolence of ecosystems by a training of readiness for the exercise of citizen participation through the mechanisms of access to information and environmental justice with the guarantee of security and integrity of social leadership.

1.4. Collective planning of the territory's vision to reduce disaster risks

The instruments for managing the territory that involve planning and development must correspond to a single capsule whose components must be structured in a coherent chain that aims at the "vision" of the territory that its inhabitants, companies and authorities define, and in its achievement they must commit and insert all their activities.

When defining the strategies to strengthen their potential and take advantage of the opportunities of the territory, the thread of connection with the disaster risk must be maintained while the alternatives of use are defined maintaining the vision of the territory, in a whole process built collectively making use of the instruments of citizen participation.

From a psychosocial approach, it is strategic to understand that the intervention of the communities that inhabit the territory, in the forms and scopes of a still fragile and amorphous participation, needs to be addressed in its current phase of the path to maturity, in terms of the limitations of communication to intervene and the perspectives or what they expect from their contribution to disaster prevention, while fully preserving the autonomy that corresponds "as civil society with respect to the public authorities" (Network of social studies on disaster prevention in Latin America, LaRED, 1996).

1.4.1. Social leadership and violence

Societies, as living organisms, react to the limitations of their rights with collective actions that are sensitive to disorder and anarchy. Although Colombian people are legitimized to demonstrate peacefully, the repeated marches in 2019 that expressed discontent with the national government culminated in disorders in which, in addition to the public and private patrimony, the rights of citizens and agents of the law were affected.

Among those marches, the one held on July 26, 2019 in 57 cities in Colombia and 53 abroad deserves special attention. Hundreds of thousands of people took part in these marches to protest against the assassination of leaders in Colombia, where 982 social leaders were threatened in the year 2019 alone. According to the Ombudsman's Office, from January 2016 to August 22, 2019, 343 leaders were murdered [Information System of the Early Warning System (SISAT). Ombudsman's Office, 2020].

The reasons for the persecution of leaders focus on three issues: land restitution, environmental protection and crop substitution. The defense of the environment focuses mainly on actions against extractive industries, an aspect related to land use issues.

According to the report of the Somos Defensores Foundation, the lives of 129 human rights defenders were sacrificed in the course of 2019 (SIADDHH, 2020), a situation that is repeated throughout the year 2020, showing how complex it isto exercise the role of citizen spokesperson in Colombia.

2. Conclusions

The great enemy of citizen participation in Colombia is violence against social leadership because it prevents communities from demonstrating their right to influence the issues that involve and affect them.

Those areas where participation opens up scenarios that can come to the discussion table with diverse proposals, still require the exercise and moderation of freedom of speech delimited by mutual respect that justifies the intervention of the authorities to prevent unlawful conducts.

In these spaces of encounter between leaders and citizens, there is still a need for training in the exercise of leadership that requires a high level of control of emotions and response to frustration, especially when the crossing of ideas and proposals are developed in competition. The formation of a reflexive character in the individuals who exercise it must aim at objectivity in terms of the recognition of general interest and the separation of particular interests.

Another aspect of citizen participation consists of assessing conflict scenarios as spaces that contain elements conducive to generating innovative social strategies that put an end to territorial management based on the persecuted and pursuers, in order to build scenarios of agreements between those who govern and those who are governed.

This is the moment to exercise creativity and innovation to transform the tense environment and to advance strategies that lead to the solution of the problems of excluded communities with few opportunities to satisfy their basic needs within the territory.

Bibliography

Comisión Económica para América Latina y el Caribe (CEPAL) (2018). Acuerdo Regional sobre el Acceso a la Información, la Participación Pública y el Acceso a la Justicia en Asuntos Ambientales en América Latina y el Caribe. https://www.cepal.org/es/acuerdodeescazu (access: 5.06.2020).

Convenio sobre el acceso a la información, la participación del público en la toma de decisiones y el acceso a la justicia en materia de medio ambiente – Aarhus (1998). Dinamarca (25 de junio). https://www.oas.org/es/sla/ddi/docs/accesoinformacion*desarrollos*convenioaahrpdf (access: 14.06.2020).

Fundación para el Desarrollo de Políticas sustentables (FUNDEPS) (2018). En: *Políticas y derechos humanos,* acuerdo regional sobre principio 10 es vinculante (9 de marzo de 2018). http://www.fundeps.org/acuerdo-regional-principio-10/ (access: 25.06.2020).

Giraldo, C. (2005). Descentralización colombiana, un producto de exportación. *Revista Opera, Nación y Territorio*, 3(3), 175–185.

Gomez, N. (2018). Colombia y el Acuerdo de Escazu. Democracia ambiental en el derecho internacional: *Una presentación sobre el acuerdo regional de América Latina y el Caribe que regula el acceso a la información, participación y justicia en asuntos ambientales*. Asociación Ambiente y Sociedad. Bogotá, Colombia. https://www.ambienteysociedad.org.co/colombia-y-el-acuerdo-de-escazu, p. 79 (access: 28.06.2020).

González, G. (2019). Social innovation as a development strategy. Urban policies and collective action. In: *Proyecto Espacios y prácticas económicas alternativas para la construcción de la resiliencia en las ciudades españolas*, pp. 29–54.

Ley, No 489 (1998). Diario Oficial de la República de Colombia. Colombia, 29 de diciembre de 1998. *Normas sobre la organización y funcionamiento de las entidades del orden nacional, se expiden las disposiciones, principios y reglas generales para el ejercicio de las atribuciones previstas en los numerales 15 y 16 del artículo 189 de la Constitución Política*. https://www.minambiente.gov.co/images/normativa/leyes/1998/ley_0489_1998.pdf (access: 2.07.2020).

Naciones Unidas (NU) (1973). Informe de la Conferencia sobre el medio humano. New York. https://www.dipublico.org/conferencias/mediohumano/A-CONF.48-14-REV.1.pdf (access: 5.07.2020).

Naciones Unidas (NU) (1993). Informe de la Conferencia sobre el Medio Ambiente y el Desarrollo. Ginebra. File:///C:/Users/USUARIO/Downloads/-UNEP%20Year%20Book%202010-2010917-spanish.pdf (access: 18.06.2020).

Organización Internacional del Trabajo (OIT) (1989). Convenio sobre pueblos indígenas y tribales (169). Nota informative, art. 7. https://www.ilo.org/dyn/normlex/es/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C169 (access: 18.06.2020).

Organización Para la Cooperación y El Desarrollo Económicos (OCDE) (2006). Citizens as Partners: Handbook on Information, Consultation and Public Participation in Policy-Making. París.

Overseas Development Administration (ODA) (1996). Ciudades en peligro, ciudades mas seguras, antes de un desastres – IDNDR-DIRDN – Decenio Internacional para la Reducción de los Desastres Naturales. Reino Unido, http://helid.digicollection.org/es/d/Jdnd27/4.1.html (access: 16.6.2020).

Red de Estudios Sociales en Prevención de Desastres en América Latina (LaRED) (1996). El futuro de la participación ciudadana ante los desastres. *Desastres y Sociedad*, 4, 26. https://www.desenredando.org/lared/antecedentes.html (access: 10.07.2020).

Valencia Hernandez, J.G. (2014). *El acceso a la justicia ambiental en Latinoamérica*. México: Editorial Porrúa.

Valencia Hernandez, J.G. (2020). El Acuerdo de Escazú y el derecho de acceso a la Justicia ambiental como elementos centrales en la construcción de una ciudadanía ambiental global. In: *Escuela de derecho ambiental*. Bogotá: Editorial Universidad del Rosario.

Abstract

Citizens, territory and disaster risk: a complex relationship for participation in Colombia

In terms of participation, the social practices of the 21st century present transformations that are expressed in diverse forms as citizens organize themselves to face the challenges and economic, social and environmental difficulties. In this way, today's societies have stopped being passive in the face of the decisions of the state that involve them in order to achieve spaces of participation with an impact on the management of public affairs. The participation of citizens in Colombia in decisions that affect the environment and society in their territories, despite the important advances made since the 1991 Constitution was adopted faces threats and challenges that must be overcome due to the situation of violence against social leaders.

Keywords: citizen participation, communities, social innovation, disaster risk, safe territories

V. NATURE AND CONFLICTS OVER SUSTAINABLE DEVELOPMENT

Integral diagnosis and conservation strategies for the Otomí Mexica Park of the State of Mexico. A systemic analysis on protected natural areas

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Introduction

More than 27 million people inhabit the metropolises of Mexico City and the City of Toluca and cause the demand for new spaces to meet the needs of housing, industrial establishments, shopping centers, recreational spaces, fields and grazing for the production of food, needed for human settlements that converge at the administrative territory of the Otomí Mexica Park. This situation is generating processes of change of land use, which negatively impact the components and functions of the park, bringing with it loss of biodiversity of flora and fauna, hydrological and soil contamination, which is vital for the local and regional development of human settlements.

The studies carried out into the geographical context of this Protected Natural Area (PNA) have not incorporated within their objectives theoretical and legal foundations that allow the design and implementation of activities related to sustainable development, which could counteract environmental and socio-cultural problems manifested inside the park (GEM, 1980). Some of the studies carried out on the park are the conservation and management programs, the functional analysis of the system of protected natural areas of the State of Mexico, and the management programs (CEPANAF, 2009; CEPANAF, 2016). They refer to the park as a complex system, although there are no precedents that promote the theoretical and legal systematization for the comprehensive study of this PNA, which will guide it towards sustainability (CONANP, 2018).

According to the Economic Commission for Latin America and the Caribbean (CEPAL, 2005), the methodology of the Logical Framework Approach contemplates the identification of the main participants involved in the development of a project or program as a starting point. From this perspective of analysis, it is vitally important to identify the groups and organizations that could be directly and indirectly related to the objectives of the program and thereby analyze their perceptions and reactions to the development and progress of the program. Social participation allows greater objectivity in the planning process and can solve disagreements among those involved.

Methodology

The methodological design applied for the comprehensive diagnosis of the territory obeys a systemic structure, in which a comprehensive analysis was carried out on the components of the environmental, sociocultural and administrative subsystems that converge and integrate the geographic space of the park. Methodologies such as SWOT Analysis and Analysis under the Logical Framework Approach established and used by different organizations worldwide and nationally were used in the analysis. And with this support, it was possible to design strategies for the conservation of natural resources in this protected natural area.

1. Stakeholder analysis

The stakeholder analysis is proposed within the Logical Framework Approach (LFA); through its application, the identification of the social, governmental and academic actors that can directly and indirectly influence the development of the conservation program was carried out, based on their experience, needs, expectations and interests. Through this analysis, we had the ability to identify the role of participation and impact that participants have on the proposed solutions to the different problems identified, which can ensure the continuity of the program. For the purposes of this study, those involved are:

1. Civil associations. Made up of groups of community members, *ejidatarios*, private property associations and non-governmental organizations, with influence in decision-making on the territory.
2. Federal, state and municipal government. Made up of government entities linked and committed to caring for the environment and the preservation and sustainable use of the natural components of the territory.
3. Academic and research bodies. Made up of universities and academic and research institutions, which develop scientific projects related to the sustainable use of the territory and its environmental and socio-cultural components.

2. Analysis of strengths, weaknesses, opportunities and threats (SWOT)

The analysis of strengths, opportunities, weaknesses and threats of the territory was carried out through the application and analysis of the SWOT method. Its development made it possible to identify the main problems faced by the administrative territory of the PNA. According to Gutiérrez (2013), the SWOT method is of a matrix and qualitative nature, it allows to identify the origin, temporality and effects of the problems. This analysis was made for subsystems (environmental, sociocultural and administrative). In this analysis threats and opportunities are considered to come from outside the system and are presented in the future. The weaknesses and strengths come from within the system and are present in the present.

3. Analysis of problems and generation of strategies

This methodological stage was carried out through the application and development of the problem tree and the objective tree. The main input of the analysis that was used in both methods, were the problems of higher hierarchical rank identified in the environmental, sociocultural, and administrative subsystems of the territory, from the SWOT analysis. The application of the problem tree allowed for a situational analysis of the main causes and effects of the problems in the territory. In accordance with the objectives of the Logical Framework Approach, the application of a problem tree allows breaking down the main problem, the causes that originate it and the main effects that these may cause over the operation of a system (Mairal, 2015).

Subsequently, the development and analysis of the tree of objectives was carried out, also called the tree of means and ends or tree of solutions. This method is a tool that allows to move from the tree of problems and causes, to the tree of means and effects in ends; besides being the starting point in the design of alternatives, leading the media towards the design of strategies.

Results and discussion

1. Involved analysis

The involved analysis has its origin in Political Science and Management Theory, and its main contribution is to generate knowledge, and help to understand the behavior of the actors and their influence on the decision-making process. This tool can be used to develop management strategies and thus facilitate the implementation of a specific decision, to understand the political context of a society and examine the feasible generation and implementation of an environmental management policy (Severiche et al., 2016). The identification of those involved was made from three perspectives of analysis: civil associations, government entities and academic and research institutions.

1.1. Identification and problems of civil associations

The civil associations that were identified during the development and analysis of those involved within the park's territory are: groups of *ejidatarios* and *comuneros*, organized in associations and legally recognized by government agencies such as the Agrarian Reform Ministry (SRA) and the Agrarian National Registry (RAN). The main interest of those who make up these groups is based on the use of ecosystems and obtaining technical training that allows them to make a sustainable use of natural resources in the long term. However, the main problem that can be opposed to these interests is the limited educational training of those who are members of these associations.

Other civic association groups that were identified during the fieldwork are non-profit civil associations and privately owned associations. The interests that were identified in these associations are oriented to be considered in decision-making on the management and use of the natural and social resources of the territory. However, the main problem that can be opposed to these interests is that non-profit civil associations do not administer territorial extensions and there is no official registry of private property associations that gives them voice and vote in decision-making that can encompass the territory of the PNA.

1.2. Identification and problems of government entities

Regarding the governmental instances that must be involved in the planning of the territory, the participation of the three levels of Government (federal, state and municipal) is considered pertinent, mainly because those governmental instances are linked and committed to the care of the environment, and the preservation and sustainable use of natural resources (DOF, 2000). At the federal level, it is the Ministry of the Environment and Natural Resources (SEMARNAT) and its decentralized bodies, the National Commission for Protected Natural Areas (CONANP), the National Water Commission (CONAGUA), the National Forestry Commission (CONAFOR), the National Commission for Knowledge and use of Biodiversity (CONABIO), National Institute of Ecology and Climate Change (INECC), and Federal Attorney for Environmental Protection (PROFEPA), which are in charge of everything related to the protection, conservation and use of the country's natural resources and the conformation and establishment of environmental policies at the national level.

At the state level, the Ministry of the Environment (SMA) of the State of Mexico is in charge of planning, coordinating, directing and evaluating matters related to environmental protection, in coordination with its decentralized bodies: the State Commission for Natural Parks and the Fauna (CEPANAF), Agency for Environmental Protection of the State of Mexico (PROPAEM), Protection of Forests of the State of Mexico (PROBOSQUE) and the State Institute of Ecology and Climate Change (IEECC). On the part of the municipal governments, the council and the environmental department of each municipality

that make up the territory of the PNA are responsible for protecting and promoting the ecological balance of their municipality (DOF, 2000).

The main interests of government agencies are those framed within the 2030 Agenda for Sustainable Development (ONU, 2015), established by the Federal Executive and aimed at eradicating poverty and achieving sustainable and inclusive development. This objective is expected to be achieved with the active participation of the three levels of government, in coordination with the Legislative and Judicial Power, private initiative, academia and international agencies.

However, the main problems that were detected during this analysis are: There are no networks of trust between the residents of the localities located within the park and in areas adjacent and the three levels of Government, which as a consequence of the constant processes of corruption and because the environmental management programs designed by the governments are established in the long term. However, their objectives have an administrative life period of six years at the federal and state level, and three years at the municipal level. This results in long-term objectives not being met, since these are usually modified during each administration, according to political, economic and social interests and commitments.

It is important to keep in mind that projects aimed at the sustainable development of the territory must be long-term, a situation that must be considered at the three levels of government since government agencies represent the largest number of economic, technological and technical contributions oriented towards the sustainable use of the geographic spaces occupied by the natural protected areas in Mexico.

1.3. Identification and problems of the academic and research instances

Regarding the academic and research instances that should be considered in the development and implementation of strategies in the territory, they are the Autonomous University of the State of Mexico (UAEMex), and several of its research centers and institutes that guide their research towards the sustainable development of the territories, in addition to other research institutes present in the State of Mexico. The interests that these institutions must pursue are those established in the legal framework of the 2030 Agenda for Sustainable Development, which establishes collaboration between the levels of Government, the Legislative and Judicial Powers, private initiative, international agencies and the academy.

The latter can provide scientific research oriented towards the sustainable development of the PNA territory. However, one of the main limitations identified in this research process is the restricted internal and external financing for the development of research projects. An example of this is the State of Mexico Council of Science and Technology (COMECyT), one of the main sources of funding for students and researchers in the State of Mexico. During 2018, it

carried out a restructuring of the strategic sectors, considering its internal policies, which resulted in giving economic support only to sectors related to the agri-food, automotive, plastic, chemical and health sectors, leaving aside everything related to the environment, sustainability and natural resources.

2. Strengths, weaknesses, opportunities and threats analysis (SWOT)

SWOT analysis is a method that is oriented towards the identification, analysis and resolution of problems. In this research with a territorial approach, the application of the SWOT method was used to identify the Strengths, Opportunities, Weaknesses and Threats that exist within the territory of the park, which were identified from the comprehensive characterization of the territory and through the application of remote sensing and photointerpretation methods and techniques, as well as field trips to the different environments that make up the geographical area of study.

2.1. Problems of the environmental subsystem

Its main weakness is due to its geographical location between three main metropolises in central Mexico. The territory presents strong anthropic pressures, the most common being the processes of environmental degradation because of changes in land cover (from forest to agriculture, from agriculture to pasture and finally in some areas, from pasture to gullies). This phenomenon tends to develop in the lower zones of the territory, where there are many localities and the network of communication routes is wider and connects the main cities of central Mexico.

Some of the threats identified in the environmental subsystem are associated with the accelerated and disorderly growth of housing in the metropolises of Mexico, Toluca and Cuernavaca, and the lack of implementation of the environmental management policies established within the PNA Management Program. Together, these threats have resulted in significant degradation and fragmentation processes, because according to the territorial characterization of the park, there is no adequate control of the socio-economic activities that take place within the park.

During field trips it was possible to observe how some agricultural, livestock, forestry and even housing activities are developed in areas of protection, conservation and even in restoration areas. This is the reality that contrasts with the objectives of the Management Plan of the Otomí-Mexica Park of the State of Mexico.

2.2. Problems of the sociocultural subsystem

The socio-cultural subsystem of the territory is made up of the 165 localities established within the administrative limit of the park, the population that

currently lives in them and the series of socio-cultural activities that take place within its geographical space of influence. The objective of the SWOT analysis of the socio-cultural subsystem was to carry out a comprehensive analysis of the characteristics of the population, education, health, housing, basic services, the economy and land tenure. These elements that are part of the territory and were selected for analysis in this research.

Most of the localities established within the park do not share the world-views of the original Otomí and Matlazinca peoples to venerate the ecosystems and natural resources of the territory symbolically. During field trips to various localities, it was possible to observe and identify how the populations of some of them make an irrational use of natural resources and ecosystems, a problem that is generating processes of change in the original land covers. Such activities can be considered the main sociocultural weaknesses to which the territory of the PNA is currently exposed.

Among some of the threats identified, it was observed that in the park geographically located between three of the largest metropolises in Mexico, these generate strong anthropic pressures with its more than 27 million inhabitants. These pressures translate into constant growth in housing, industrial and service infrastructure such as communications, transportation and recreation. Activities generated in the areas surrounding the park represent problems of atmospheric, water, acoustic, visual and soil contamination within the limits of the PNA.

2.3. Problems of the administrative subsystem

The administrative functions of the Otomí-Mexica Park of the State of Mexico are closely related to the working groups of the federal, state and municipal public administration, academic institutions and research centers, local groups, businessmen, non-governmental organizations and other organizations of a social or private nature. Each institution or working group is in charge of effectively organizing administrative, accounting and operational flows, which allow them to define priorities, needs and mechanisms of instrumentation in the medium and long term, in favor of the conservation and sustainable management of the territory in addition to developing and implementing efficient mechanisms, capable of integrating the different levels of authority involved in the management and administration of the park.

However, from a real perspective, the park's administrative functioning presents a series of administrative deficiencies that have put the objectives of the PNA's decree into question. From this perspective, through the SWOT analysis of the park's administrative subsystem, it was possible to identify the internal and external causalities that the territory faces in administrative, legal and social organization matters.

As part of the internal limitations, several weaknesses that emerged from a series of multi-institutional investigations were identified. The most

representative one focuses directly on the risk indexes at the national level since the park's territory is geographically located among the most vulnerable regions of the country. These regions were classified according to 18 factors that threaten biodiversity, such as fragmentation, change in land cover and the increase in the population with social marginalization. Some of these factors caused by the scarce labor, research and administrative relationship of the three levels of government with academic institutions and research centers, local groups, businessmen, non-governmental organizations and other organizations of a social or private nature determine and implement comprehensive long-term strategies for the benefit of the territorial components of the park.

As part of the external limitations that directly affect the functioning of the PNA's administrative subsystem, several threats were identified: the first and most important of them is that the Otomí-Mexica Park region lacks an administrative scheme that promotes collaboration and articulation between the three levels of government with NGOs, academics, agricultural producers, private initiative and land owners. The land owners do not participate in management programs, land use plans and municipal development plans.

3. Analysis and generation of strategies

3.1. Analysis and generation of strategies for the natural subsystem

The environmental subsystem of the park is made up of ecosystems, which in turn are made up of a series of natural resources of flora and fauna. The analysis of this subsystem was carried out through a comprehensive study of the environment and the elements that comprise it.

As can be seen in the SWOT matrix of the environmental subsystem of the park, the main strength is its biogeographic location, a biogeographic characteristic that provides the territory with a significant biodiversity of flora and fauna, and that generates an important variety of ecosystem services such as: water, oxygen, food, raw materials among other services which are used by the local populations and surrounding the territory of the PNA (Villegas et al., 2018; Villegas et al., 2019).

As part of the opportunities that the territory may have in the future, some areas of the park have federal protection, since they are part of other protected natural areas administered by the federation. In addition, 90% of the PNA's territory is declared by CONABIO and some international NGOs (GREENPEACE and Conservación Internacional México) as the Great Water Forest. National and international declarations can be translated into opportunities to manage economic, scientific, technological, academic and community resources, in favor of the conservation and environmental improvement of the ecosystems that make up the territory of the park.

3.2. Analysis and generation of strategies for the sociocultural subsystem

The main identified strength of the sociocultural subsystem is based on the worldview of its inhabitants, since, within the territory of the PNA, a series of localities are established that still preserve the ideologies of the original peoples of central Mexico, who venerated and still revere the forests of the park, classified as "Sanctuary of Water", "Protected Natural Area" and "Ecological Heritage of the State of Mexico". This situation that can help to improve the care of ecosystems and natural resources, in addition to being one of the key pieces for the development of environmental education programs, which should be aimed at disseminating the environmental, sociocultural and historical importance of the Otomí Mexica territoryamong the localities that are established within the administrative limit of the PNA as well as the localities bordering its geographical space.

However, despite the large number of weaknesses and threats that the Otomí-Mexica territory faces, it was possible to identify a series of valuable opportunities that could help to counteract and improve the above. One of them is oriented towards the educational sector, in which statistics indicate that 96% of the inhabitants of the PNA are literate, a situation that could help to improve the environmental characteristics and preserve the socio-cultural features of the territory by the development and implementation of environmental education programs aimed at the government and social sectors of the municipalities that make up the park (Poteete et al., 2011).

3.3. Analysis and generation of strategies for the administrative subsystem

The main potentialities are closely related to its geographical location, since this gives it a series of biological and socio-cultural elements supported by multiple comprehensive, multidisciplinary and multi-institutional scientific investigations. As its main administrative strength, it is considered that geographically the territory of the PNA is located within the regions of greatest biological importance, according to the Index of Biological Importance (IIB), developed by CONABIO, CONANP, The Nature Conservancy (TNC), and PRONATURA in 2007. The Index was designed from 47 variables, including primary vegetation cover, number of vegetation types, number of endemic species of vertebrates and species of plants and vertebrates included in NOM-059-SEMARNAT-2001 (Koleff et al., 2009).

It includes the spatial location of areas of national importance for hydrological and terrestrial wildlife conservation, within the territory of the PNA. These are some of the strategies designed by the federation and developed jointly with other public, social and private organizations at the national level to counteract environmental deterioration.

The identification of these strengths of administrative type, offers important opportunities related to the development of multi-institutional programs;

comprehensive strategies that promote the conservation and improvement of the PNA territory are proposed and implemented.

The opportunities identified are mainly oriented towards the development of inter-institutional projects aimed at the conservation and improvement of the territory. Of the institutional interrelations, it is stated that an internal oversight council, composed of authorities from the federal, state, and municipal public administration, academic institutions, research centers, local groups, businessmen, NGOs and other social organizations as well as individuals with recognized and prestige in the field of PNA should be organized. It can be a viable opportunity to institute traceability and monitoring protocols for programs and strategies, based on a series of biophysical, sociocultural and administrative indicators, with which the current and continuous status of the territorial components of the park can be determined. It is important to emphasize that, for the proper functioning of an internal council, it must have a fund as an autonomous trust that can concentrate government, private and civil contributions, and allocate them to the priorities of the territory and its population.

Discussion

Derived from the theoretical frameworks of the systemic approach (Von Bertalanffy, 1976), the advent of complex thinking (Morín, 1984; Leff, 2007) and the internal interconnectivity of the components of the territory (Capra, 1998), the study of natural and social systems must be carried out from a systemic-integral approach in order to understand that our reality is a whole system, which allows us to understand the compression of new levels of reality.

Under these theoretical perspectives, the methodological structure is supported, based on empirical and theoretical experience and the postulate of the importance of relationships and entities (Morín, 1998; Capra, 2006; García, 2006; Buzai, 2014).

The development of this model is based on the systemic approach, developed and fed back from the theoretical positions of the General Systems Theory (Von Bertalanffy, 1950), Theory of Cybernetics (Wiener, 1958), Theory of Complex Thought (Morín, 1998), The web of life (Capra, 2006) and the Theory of Complex Systems (García, 2006) to mention some of the most relevant theoretical proposals, and in the integral approach, which has been developed through the postulates of Holism and Evolution, General Systems Theory (Von Bertalanffy, 1950) and the Theory of Everything (Wilber, 2001).

Such approaches helped to understand the theoretical bases for the importance of analyzing reality from as many dimensions as possible, and the relationships that exist between its components. Under this systemic-integrative research scheme, the PNA's sustainable management proposal was designed and modeled, using methods from different disciplines of knowledge under the approach of Environmental and Human Geography focused on the comprehensive study of protected natural areas (Figure 1).

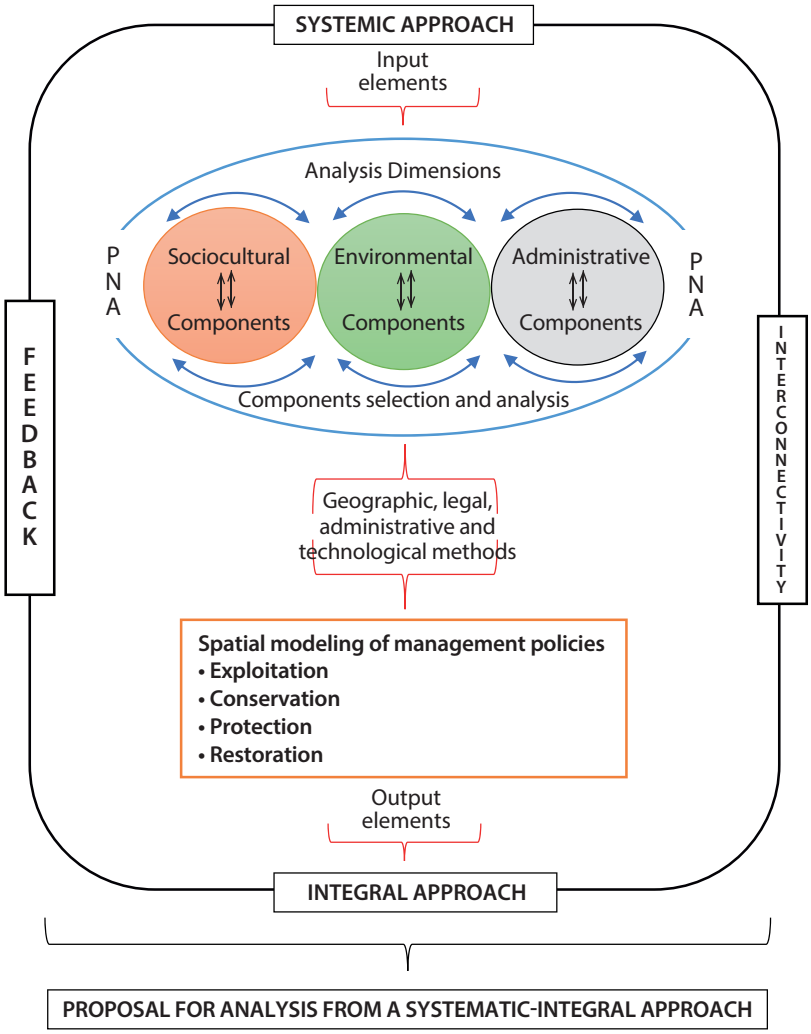


Figure 1. Theoretical model for geospatial modeling of environmental management policies in territories under environmental protection

Source: Authors' elaboration

Conclusions

With the development of the involved analysis, it was possible to identify the largest number of institutions that should be considered in the development of strategies, programs and policies for environmental management. One of the objectives of this study is the restructuring of the PNA's environmental management policies, based on a methodological and theoretical perspective, and conceived from an inclusive, comprehensive and holistic thinking. For this

reason, the involved analysis allowed to give greater objectivity to the territorial analysis process, in order to clarify who should be involved in the proposed analysis and be present throughout the design and execution of the program, since they play an important role in the selection of strategies, monitoring and evaluation.

During the development, analysis and conclusion of the systemic and comprehensive diagnosis of the territory, the administrative subsystem was included in the comprehensive analysis of the park's territory, so that the interrelationships between its components increased considerably, since the diagnosis of the territory was carried out through starting from the environmental, sociocultural and administrative subsystems. The main problems identified in the operation of the park are the processes of changes in land use and vegetation, generated by three transformation processes of an anthropic nature: conversion, fragmentation and modification (interrelationships between the environmental and sociocultural subsystems), which results in the lack of instrumentation of strategies generated from the modification administrative subsystem (interrelationships between the environmental, sociocultural and administrative subsystems).

Based on the foregoing, it is inferred that research should be directed under a systemic and integrative approach, to promote studies that comprehensively analyze the problems or phenomena that afflict the territories under environmental protection; and thereby generate the understanding of new levels of reality analysis, so that it is possible to construct the interrelation between phenomena.

Bibliography

Asamblea General de la Organización de las Naciones Unidas ONU (2015). Agenda 2030 para el Desarrollo Sostenible. Nueva York: EUA.

Buzai, G.D. (2014). Geografía, Complejidad e Investigación Aplicada. *Boletín de Estudios Geográficos*, 102, 46–66.

Capra, F. (2006). Trama de la vida. Barcelona: Editorial Anagrama edición. 1ª edición en español.

CEPAL (2005). Panorama social de América Latina 2005. Comisión Económica para América Latina y el Caribe.

CEPANAF – Comisión Estatal de Parques Estatales y de la Fauna (2009). *Programa de Conservación y Manejo Parque Estatal Otomí-Mexica*. México: Toluca Estado de México, Gobierno del Estado de México.

CEPANAF – Comisión Estatal de Parques Estatales y de la Fauna (2016). *Programa de Manejo Parque Otomí-Mexica del Estado de México*. México: Toluca Estado de México, Gobierno del Estado de México.

CONANP – Comisión Nacional de Áreas Naturales Protegidas (2018). Programa Nacional de Áreas Naturales Protegidas 2014-2018. Ciudad de México: Editorial CONANP.

DOF – Diario Oficial de la Federación (2000). Reglamento de la Ley General del Equilibrio Ecológico y Protección al Ambiente en Materia de Áreas Naturales Protegidas. Distrito Federal México.

García, R. (2006). Sistemas Complejos. Conceptos, métodos y fundamentación epistemológica de la investigación interdisciplinaria. Barcelona: Editorial Gedisa.

GEM – Gobierno del Estado de México (1980). Decreto del Área Natural Protegida Parque Ecológico, Turístico y Recreativo Zempoala-La Bufa denominado Parque Otomí-Mexica del Estado de México. México: Toluca Estado de México, Gobierno del Estado de México.

Gutiérrez, J.G. (2013). *La Investigación geográfica. Fundamentos, métodos e instrumentos*. Buenos Aíres: Editorial Dunken.

Koleff, P., Tambutti, M., March, I.J., Esquivel, R., Cantú, C. y Lira-Noriega, A. (2009). Identificación de prioridades y análisis de vacíos y omisiones en la conservación de la biodiversidad de México. *Capital natural de México*, 2, 651–718.

Leff, E. (2007). La complejidad ambiental: del logos científico al diálogo de saberes. En: O. Sáenz (ed.), *Las Ciencias Ambientales: una nueva área del conocimiento*. Bogotá: Red Colombiana de Formación Ambiental.

Mairal, D. (2015). El árbol de objetivos (goal tree) como método para establecer criterios. Retrieved from: http://www.aragonvalley.com/arbol-de-objetivos-goal-tree-metodo-establecer-criterios/#.XjXREDIzbIU.

Morín, E. (1984). Ciencia con consciencia. Barcelona: Editorial Anthropos.

Morín, E. (1998). Introducción al pensamiento complejo. Barcelona: Editorial Gedisa.

Morin, E. (1998). Epistemología de la complejidad. In: Fried, D. (ed.) *Nuevos paradigmas: Cultura y subjetividad*. Buenos Aires: Paidós.

Poteete, A., Janssen, M. y Ostrom, E. (2011). Trabajar Juntos. Acción colectiva, bienes comunes y múltiples métodos en la práctica. México: Editorial FCE-UNAM, 2ª edición en español.

Severiche, C., Gómez, E. y Jaimes, E. (2016). La educación ambiental como base cultural y estrategia para el desarrollo sostenible. *Telos*, 18(2), 266–281.

Villegas, D., Gutiérrez, J.G., Espinosa, L.M., y Makowski, J. (2018). Importancia socioambiental del Parque Otomí-Mexica del Estado de México. En: M.V. Santana, G. Hoyos, G. Santana, F. Zepeda y J.R. Calderón (eds.), *Vulnerabilidad, Resiliencia y Ordenamiento Territorial*. México: Editorial UAEMex.

Villegas, D., Gutiérrez, J.G., Gómez, W. y Espinosa, L.M. (2019). Procesos que influyen en las transformaciones territoriales de zonas bajo diferentes políticas de manejo ambiental en el Parque Otomí-Mexica del Estado de México. In: M.V. Santana, R.M. Sánchez, F. Zepeda, J.R. Calderón y G. Santana (eds.), *Transformaciones territoriales en México y Polonia: Vulnerabilidad, resiliencia y ordenación territorial*. México: Editorial UAEMex.

Von Bertalanffy, L. (1950). An Outline of General Systems Theory. *British Journal for the Philosophy of Science*, 1, 139–164.

Von Bertalanffy, L. (1976). *General System Theory: Foundations, Development, Applications*. New York: George Braziller.

Wiener, N. (1958). *Cibernética y sociedad*. Buenos Aires: Editorial Sudamericana, 1ª edición al español.

Wilber, K. (2001). *Una teoría de todo. Una visión integral de la ciencia, la política, la empresa y la espiritualidad*, Barcelona: Editorial Kairós.

Abstract

Integral diagnosis and conservation strategies for the Otomí Mexica Park of the State of Mexico. A systemic analysis on protected natural areas

The objective of this study was to carry out a comprehensive diagnosis based on a systemic analysis for the Otomí Mexica Park of the State of Mexico, and on this basis design relevant and feasible conservation strategies for this protected natural area, which due to its location between two large metropolitan areas, that of Mexico City and that of Toluca City, are subject to demographic, economic and social pressures.

The methodology applied is based on the integral characterization of the park territory that was carried out under the epistemological considerations of the geographical principles of location, description, comparison, causality, activity and relationship, with a systemic thinking approach, centered on the culture-nature relationship and applying geographic information systems. These foundations allowed to locate, analyze and describe from the systemic approach, the interrelations that exist between the elements that make up the biophysical subsystem and the socio-cultural subsystem of the park and thereby determine its current state.

The methodological design applied for the integral diagnosis of the territory is due to a systemic structure, in which an integral analysis was carried out on the components of the environmental, socio-cultural and administrative subsystem that converge and integrate the geographical space of the park and through methodologies such as SWOT Analysis and Analysis under the Logical Framework Approach established and used by different organizations worldwide and national level. And with this support it was feasible to design strategies for the conservation of natural resources in this protected natural area.

Keywords: conservation strategies, integral diagnosis, Otomí Mexica Park, protected natural areas, systemic analysis

Objective six of sustainable development 2030: characterization in hydrosocial territory in the south of the State of Mexico

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Introduction

The 2030 Agenda was approved on 25 September 2015, by 193 Member States of the United Nations (UN). This is a planning tool that aims to move towards a model sustainable development, considering 17 objectives, focused on people, prosperity, planet and peace. With the fulfillment of these objectives, it seeks to reduce poverty, inequalities, protect human rights, build prosperous, just and peaceful societies, taking care of natural resources and the planet [United Nations System in Mexico, 2020 (Sistema de Naciones Unidas en México), 2020].

The target six, so-called "water and sanitation", seeks to ensure availability, sustainable management and sanitation of water resources for all, as it is considered a human right. At the end of the second decade of the 21st century there are still people who do not have access to water-related services, such as drinking water. On the other hand, they do not have effective treatment plants that guarantee the potability of the resource before being discharged into a river, lake and the ocean.

It should also be mentioned that the UN contemplates ten notable points which in some way synthesize the problems related to "water and sanitation" at a global level: "Data highlights

1. Three out of ten people lack access to safe drinking water services and six out of ten lack access to safely managed sanitation facilities.
2. 892 million people continue to practice open defecation.
3. Women and girls are in charge of collecting water in 80% of households without access to running water.
4. Between 1990 and 2015, the proportion of the world's population using an improved source of drinking water increased from 76% to 90%.

5. Water scarcity affects more than 40% of the world's population and this percentage is expected to increase. More than 1.7 billion people currently live in river basins where water consumption exceeds recharge.
6. Four billion people lack access to basic sanitation services, such as toilets or latrines.
7. Over 80% of wastewater resulting from human activities is discharged into rivers or the sea without any treatment, causing pollution.
8. Every day, about 1,000 children die from diarrheal diseases associated with poor hygiene.
9. Approximately 70% of all water extracted from rivers, lakes and aquifers is used for irrigation.
10. Floods and other water-related disasters account for 70% of all deaths related to natural disasters." (United Nations System in México, 2020).

It must also be said that in order to face these remarkable data that establish the problems and relevant aspects related to goal six, the UN also established six goals and two sub-goals to be met by 2030 and these are: "The targeted six goals for sustainable development, 2030.

1. Universal and equitable access to drinking water at an affordable price for all.
2. Access to adequate and equitable hygiene and sanitation services for all and end open defecation, paying special attention to the needs of women, girls and people invulnerable situations.
3. Improve water quality by reducing pollution, eliminating dumping and minimizing the emission of chemicals and hazardous materials, reducing the percentage of untreated wastewater by half and significantly increasing recycling and safe reuse worldwide.
4. Significantly increase the efficient use of water resources in all sectors and ensure the sustainability of freshwater extraction and supply to address water shortages and significantly reduce the number of people suffering from water shortages.
5. Implement integrated management of water resources at all levels, including through cross-border cooperation, as appropriate.
6. Protect and restore water-related ecosystems, including forests, mountains, wetlands, rivers, aquifers, and lakes.
   6a. Expand international cooperation and support to developing countries for capacity building in activities and programs related to water and sanitation, such as water harvesting, desalination, efficient use of water resources, wastewater treatment, recycling and reuse technologies.
   6b. Support and strengthen the participation of local communities in improving water and sanitation management." (United Nations System in Mexico, 2020).

Let us now consider the relationship of objective six with the characterization of a hydrosocial territory in the south of the State of Mexico. In the

first place, it is necessary to mention that the territory to which we refer in this work is the municipality of Coatepec Harinas, which is a non-urbanized territory. The characterization and the concept of hydrosocial territory refers to the study of the relationships that keep three elements: water, territory and society based on the water resource to which they have access through infrastructure at different levels of services, as well as technology and quality, in most cases linked to the type of activity and social organization that manages, builds, administers, controls and, at the same time, configures a territoriality based on its meaning, relevance, relationship and the construction of agreements.

With regard to understanding the meaning of the word "territory" it is advisable to make a series of clarifications of its roots and with this we refer to the origins of the word, In this sense in etymological terms it is a word that comes from the Latin *territorium* which means "politically divided land extension". The lexical components are: terra (land), plus the suffix orio (belonging, place). Capel (2016) mentions that this word was found in Spanish as well as in French as early as the 13th century.

The Dictionary of the Royal Spanish Academy (2019) defines the territory in this way:

"from Latin – Territorium with four meanings:

1. m. Portion of the earth's surface belonging to a nation, region, province, etc.
2. m. Land; field or sphere of action.
3. m. Circuit or thermal that includes a jurisdiction, an official role or other analogous function.
4. m. Specific land or place, such as a cave, a tree or an anthill, where a certain animal lives, or a group of animals related by family ties, and which is defended against the invasion of other congeners".

Capel (2016) explains that there are specialized dictionaries in urban geography, urban planning and spatial planning that define the territory as "a geographic space in the broad sense attributed to an individual being or a collective entity" (Grupo Aduar, 2000). The Dictionary of Human Geography defines it as: "the portion of space occupied by a person, group or state; in its most social geographical use, the territory refers to the limited social space, occupied by different social groups as a consequence of the implementation of their territoriality or the field of power over a space exercised by the dominant institutions. From this perspective, the territory can be used as an equivalent of the spatial concepts of place and region" (Johnston, Gregory y Smith, 2000; citados en Capel, 2016, p. 3).

It should also be mentioned that talking about territory is not only naming or ordering objects within a space, it also has other purposes, such as approaching the concept as a strategy related to the communication of different meanings, especially classificatory in order to establish forms of identity and difference, thereby managing to control what is inside, limiting access

or excluding others; in this way it works as a control mechanism to promote order, security and peace in a more clear and simple way, contributing to the progress of a social group (Hernández, 2018; interpreted by Delaney, 2005).

In this sense, territories present a dynamic for their formation and construction based on societies, and specifically based on the interactions between the different social actors. However, as it requires other aspects to stimulate this process. Duarte et al. (2015), Rodríguez and Boelens (2016) comment that interactions with technology and nature are essential.

On the other hand if the territory is analyzed with the greatest number of possible interconnections can find another term partner that adds to the breadth of understanding and conceptualization of the first, this concept is territoriality, this broad understanding of the territory and involving different forms of thinking, acting and being in the world, the ways of building based on beliefs, desires, cultures and circumstances, one can say the material and metaphysical phenomena, which are structured by the collective and individual conscience of a certain social group (Delaney, 2005; Hernández, 2018).

We can now explain the concept of hydrosocial territory: it assumes relationships, meanings, symbols, beliefs, culture and agreements, development, organization, establishing and defining social actors in relation to water resources in a given territory.

Let us consider some theoretical aspects of hydrosocial territory, starting with the contribution of Boelens et al. (2016; quoted by Hernández, 2018), who mentions the elements that make up the term in the following way: "A rebellious imaginary and socio-environmental materialization of a spatially united multiscale network, in which human beings, water flows, ecological relationships, hydraulic infrastructure, financial means, administrative-legal arrangements, cultural institutions and practices are defined, aligned and mobilized interactively through epistemological belief systems, political hierarchies and naturalizing discourses" (Boelens et al., 2016, p. 2; quoted by Hernández, 2018).

So the definitions of other authors as cited Hernández (2018), we speak of "hydrosocial configuration" and in this term we can find concepts such as: "hydro-social cycle" (Swyngedouw, 2009), "sociometabolic profiles" (Zanuccoli et al., 2011), "water flows and power flows" (Meerganz von Medeazza, 2006), "hydric landscapes" (Budds, 2010), view: Rodríguez (2017), cited in Hernández (2018).

Methodology

The methodology used was of a multi-method type based on the use of qualitative methods and techniques that allowed to achieve the characterization of the hydrosocial territory considering the priority of objective six "guarantee the availability, sustainable management of water and sanitation for all", exposing

the situation of access, control and the relationships between the different social actors.

The multi-method consisted of three stages. The first was the documentary investigation to obtain sources of information: articles, books, statistics, geostatistics, Public Registry of Water Rights (REPDA) for its acronym in spanish and specialized bibliography, as well as cartography, aerial photographs and satellite images.

The second stage consisted in the selection of adequate information, with this a structured matrix was made based on two questionnaires, one of them referring to the ten notable points. The second questionnaire was based on the six goals and two subgoals established by the UN to deal with the relevant problems and aspects, considering that these goals must be met by 2030, and in this sense it assessed the context of the hydrosocial territory and its relation to goal six.

In addition to structuring the questionnaires, a strategic plan was developed to carry out field work, through tours and key participatory interviews, in order to obtain reliable information on the characterization of the hydrosocial territory and its relationship with objective six. This plan was based on the anthropological method, identifying the social actors and the infrastructure to give way to prolonged stays (two to three months in the rainy season) and semi-permanent stays (the dry season) in which semi-structured interviews were applied to the Irrigation Unit, producers and authorities. It was possible to know the form of social organization for the development of agricultural and floricultural activities making use of the water resource and with it the way in which they had built a territoriality and the configuration of the territory.

The third stage consisted of the qualitative and quantitative analysis of the information obtainedduring research, compared to the field work. The results obtained characterized the water sources, the social actors, the territoriality and the configuration of the hydrosocial territory, considering the three actors: water, territory and society, as well as the technologies used by each of the social actors for access, agreements, administration and control of water.

Results

Regarding the characterization of the hydrosocial territory, let us consider that important water sources circulate through the municipality from runoff from the Xinantécatl Volcano, better known as the Nevado de Toluca, a hydrological source of vital importance for the Toluca and Tenango Valley.

Based on the Public Registry of Water Rights (REPDA), the municipality has 60 titles that protect agricultural use with a total volume of 55'072,348.80 m^3 per year, extracted from 32 springs, 15 rivers, 8 streams, 4 wells and a riverbank. As shown in Table 1, the volume of water consumption by title ranges from 2,250 m^3 per year to 15,768,000 m^3 per year.

Table 1. Titles with agricultural use

Number	Volume (m^3/year)	Use covered by the Title	Source
1	25 228,00	Agricultural	Water springs CLARA 1, 2 Y 3
2	13 478,00	Agricultural	Springs LOS SAUCES I Y II
3	20 736,00	Agricultural	Spring LA MESA o LA TRINIDAD
4	6 143 040,00	Agricultural	River LAJA o River LAS FLORES
5	787 968,00	Agricultural	Stream LA TORTUGA
6	165 888,00	Agricultural	Stream CANOITAS
7	60 000,00	Agricultural	Spring LAS TINAS
8	36 495,00	Agricultural	Spring AGUA ZARCA
9	126 144,00	Agricultural	Spring AGUA ZARCA
10	50 572,80	Agricultural	1504 – TENANCINGO
11	18 000,00	Agricultural	Stream CALICANTO
12	20 736,00	Agricultural	Spring OJO DE AGUA
13	115 550,00	Agricultural	River LAS FLORES
14	378 432,00	Agricultural	Streams EL MOLINO Y TIERRAS BLANCAS 1 Y 2
15	60 000,00	Agricultural	Spring RINCON DE LAS HADAS
16	518 400,00	Agricultural	River EL SALTO
17	18 255,00	Agricultural	BORDO ESPINOZA I
18	275 121,00	Agricultural	Spring LOMA DE ENMEDIO
19	63 072,00	Agricultural	Stream LA CRUZ
20	2 460,00	Agricultural	Spring EL FRESNO
21	16 912,00	Agricultural	Spring LA JOYA
22	12 614,00	Agroindustrial	Spring LA CIENEGA
23	68 947,00	Agricultural	River LAS FLORES
24	51 840,00	Agricultural	Spring JOYAS DE DON ABEL
25	11 795,00	Agricultural	Spring EL POCITO
26	17 400,00	Agricultural	Spring EL MANZAN0
27	2 250,00	Agricultural	Spring LOS ENCINOS
28	2 250,00	Agricultural	Spring LA ROSA
29	9 960,00	Agricultural	Spring LA ROSA
30	21 000,00	Agricultural	Spring LOS AILES
31	48 000,00	Agricultural	1504 – TENANCINGO
32	40 000,00	Agricultural	1504 – TENANCINGO

Number	Volume (m^3/year)	Use covered by the Title	Source
33	49 766,00	Agricultural	Stream LA FRAGUA
34	24 261,00	Agricultural	Spring LA TRINIDAD Ó LA MESA
35	6 000,00	Agricultural	Spring EL MANZANO
36	39 823,00	Agricultural	Spring AGUA ZARCA
37	24 000,00	Agricultural	Spring LOS CARRIZOS
38	539 136,00	Agricultural	Springs OJO DE AGUA, A. LOS AMARGOS 1 Y 2, LOS JARROS, LOS CAPULINES, LA HILAR, LA CIENEGA Y TE
39	894 000,00	Agricultural	Spring LA TOMA
40	589 680,00	Agricultural	River EL SALTO
41	199 895,00	Agricultural	River CHILTEPEC
42	6 894 823,00	Agricultural	River LAS BURRAS
43	2 310 295,00	Agricultural	River CHIQUIHUITERO
44	331 776,00	Agricultural	0 – COATEPEC HARINAS
45	37 340,00	Agricultural	Spring LA JOYA
46	37 340,00	Agricultural	Spring LA CIENEGA I
47	37 340,00	Agricultural	Spring LA CIENEGA II
48	30 850,00	Agricultural	Spring EL FRAYLE
49	37 340,00	Agricultural	Spring PUENTE DE TIERRA I
50	37 340,00	Agricultural	Spring PUENTE DE TIERRA II
51	2 633 472,00	Agricultural	River PACHUCA
52	435 456,00	Agricultural	Stream CAPULIN
53	933 120,00	Agricultural	River LAS PITAYAS
54	199 584,00	Agricultural	Springs LA CAÑADA Y OJO DE AGUA
55	9 123 840,00	Agricultural	River MEYUCA
56	744 000,00	Agricultural	River MEYUCA O LAS PITAYAS
57	1 923 264,00	Agricultural	River LAS PITAYAS
58	1 179 360,00	Agricultural	Stream PASO DEL BUEY O TECOLOTEPEC
59	808 704,00	Agricultural	River CHIQUIHUITERO
60	15 768 000,00	Agricultural	River LAS FLORES, EL TELAR O JABALI, Streams SAUDA O MOMOXTLE Y EL SALTO
Total volume	**55 072 348,80**		

Source: Authors' elaboration based on REPDA

In view of the above, the water from rivers and streams constitutes one of the first elements for agricultural and flower production; the water resource of these tributaries is derived by canals until it reaches the farmland. For this, it is necessary to build agreements and hydraulic works between social organizations. In Coatepec Harinas and according to REPDA data there are 60 users with a concession title for agricultural use, with producers among their members (small and medium), companies, and 15 Irrigation Units (UR).

To illustrate the above, the operation of a UR, located in the community of Ixtlahuaca, is described below, with the aim of showing part of the results obtained, which allowed to know the organization and operation of social actors in the configuration of the social territory through its territoriality and management of water resources, as well as the relationship of the context and situation that it has with goal six of sustainable development 2030 in the period from 2019 to 2020.

In the UR everything begins once the river water has been diverted; the liquid enters a general canal l approximately 2 m wide by 1.5 m high, through which it will circulate by means of gravity. In its first kilometers, the canal is lined with cement to later modify its measurements by a secondary canal approximately 1.50 m wide and 80 cm deep.

Subsequently, divisions into canals of one meter wide by 60 cm are presented to supply the users that make up the UR. The derivations are presented by means of drawers that are made in thecanals, as shown in image one, whose function is to concentrate a greater volume of water and divert it through gates to anothercanal.



Figure 1. Derivative work



Figure 2. Storage tank

Source: Authors

The secondary canals, in addition to supplying water to the users, are used to fill storage works that are generally of two types. Community storage tanks provide water to the lands located in the upper parts, as can be seen in Figure 2.

Another type are the *reservoirs* whose construction is based on the financial capacity of the users, they fulfill the function of reservoirs so that the producer has water available at any time. Their construction and location is shown in Figure 3. They are located near the greenhouses. This type of *reservoir* is of different sizes: four by five meters, four meters deep, being privately owned. Also, there are community *reservoirs* which measure 40 by 50 meters and are 10 meters deep as seen in Figure 4.





Figures 3 and 4. Reservoirs: left – private property next to greenhouses, right – community

Source: Authors

For proper distribution of water between users and the administration of the hydraulic work there is a committee of social organization that is comprised of a president, a secretary and a treasurer. There is also a person in charge of the distribution of water among users, whose activity involves knowing and visiting all the existing hydraulic works. He is called "the gutter, delivery man or plumber"; he knows the general and secondary canals and the ditches through which the water flows, as well as the intakes, valves and gates, which make up the system to assign, supply, divert and regulate water.

The distribution of water is on Sunday in a period from March to June. It starts on the first Sunday of March in two ways, one following the list and two based on the place that users get when they arrive at the committee's

offices, which opens at 7 am, although there are users who arrive at 5 am. For the assignment you must have met at least two requirements; 1) having participated in the tasks involving the cleaning of the general canals, 2) The payment for the right to water is between $ 400 and $ 500 pesos, about 17 to 21 euros and $ 20 to $ 25 dollars at the exchange rate at the closing of the year 2020.

The volume is assigned based on local measurement unit called "melga" that according to the plumber is equivalent to water flowing through a 10-inch canal from 7 am to 1 pm and 1 pm to 7 pm, for those users who only require half a water tank or the equivalent of the volume that can reach the farmland in a period of three hours.

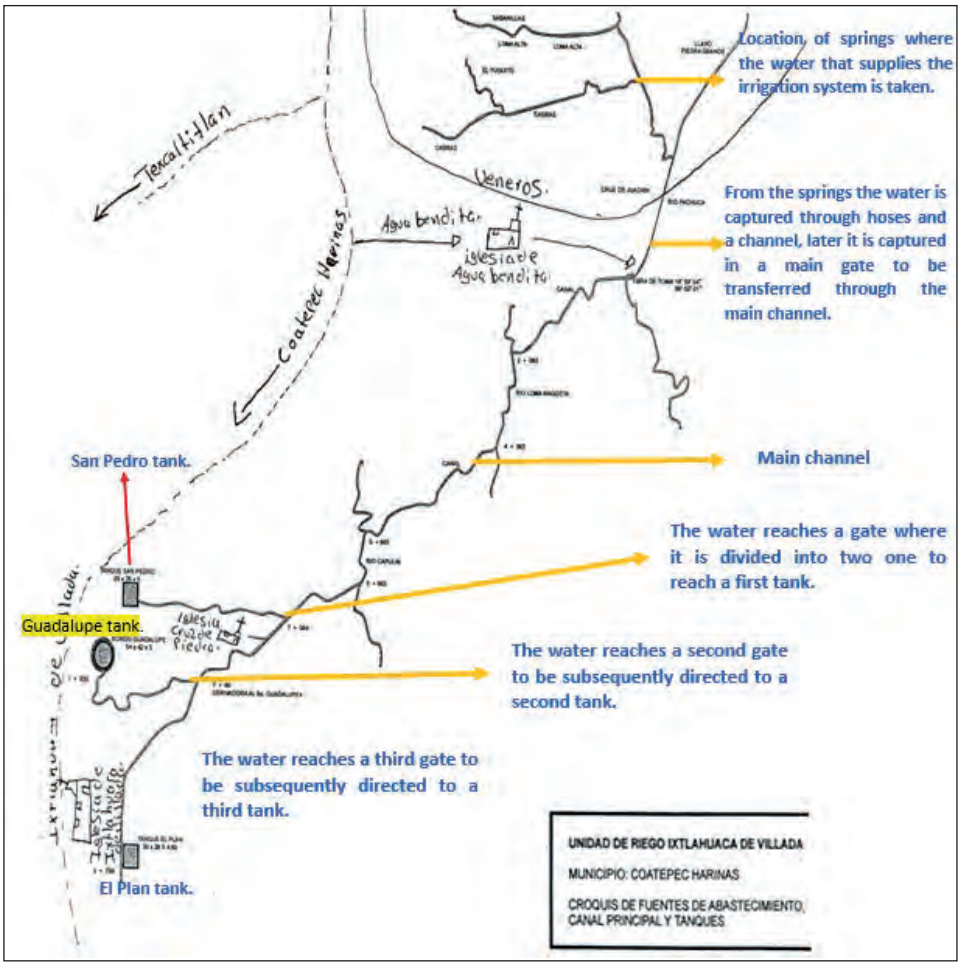


Figure 5. Sketch of the irrigation unit, Ixtlahuaca de Villada, from the springs through general canals to tanks

Source: Authors (document edited with the sketch of the Irrigation Unit)

Watering is done before 7 pm after the plumber closes the valves. From July to September, when the rainy season is more constant and intense, the water that flows through the canals is not used since the rainfall is now the one that encourages the development of open-air crops and the one that fills the reservoirs. The water in the canals in the rainy season flows freely, being used by a producer who can make use of it at no cost. After the rainy season, that is, from October to February, a second stage of irrigation distribution among producers occurs.

Figure 5 shows the UR sketch that was described in the previous paragraphs. It should be noted that said document is presented on the basis of the scheme with which the committee and the plumber work. You can see the tributary and the derivations that are made for the control and access of water, as well as the infrastructure works carried out.

In view of the above, the social actors exerted they territoriality under that conditions into the municipality territory. In relation to the ten highlighted data, the two tables summarize the variables related to the case study. Similar results, especially for UR and small producers are shown, while companies have better conditions regarding the first two actors since these are located in the urban peripheries, a few kilometers from the municipal head or urban infrastructure, while the others are located more than three kilometers from the urbanized areas.

Table 2. Contextualization of the variables of the problematization of objective six

Relationship with notable data	Variables	Irrigation units	Small producers	Company
1	Access and security	No	No	Yes
	Consumption vs affectation	Yes	Yes	Yes
2, 6 y 7	Sanitation	No	No	Yes
3	Women and water management	Yes	Yes	Yes
4	Water treatment	No	No	No
5	Shortage	Yes	Yes	Yes
7	Surplus	Yes	Yes	Yes
8	Pollution diseases	No	No	No
9	% water for irrigation	100	100	100
	% water for human consumption	0	0	0
10	Natural hydric disasters	No	No	No

Source: Authors' elaboration based on the methodological analysis

Table three shows the contextualization of the variables in relation to the six goals and two subgoals established by the UN to face the problems of goal six, considering that these should be met by 2030. The results also show hydrosocial territoriality.

Table 3. Contextualization of variables regarding the goals of objective six

Relationship with goals	Variables	Irrigation units	Small producers	Company
1	Equitable access and affordable price	Yes	Yes	Yes
2	They have adequate sanitation	No	No	No
3	Actions to avoid polluting	No	No	No
	Use of eco-technologies	Yes	Yes	Yes
	% use of rainwater	20%	20%	20%
4	Actions for efficient use	Yes	Yes	Yes
5	Government programs	Yes	Yes	Yes
6	Ecosystem protection actions	No	No	No
6 a	Water management training	No	No	No
6 b	Supports for water management	No	No	No

Source: Authors' elaboration based on the methodological analysis

As can be seen in Table 3, the actors of the hydrosocial territory are managing to respond to three and a half goals established. Considering that there are eight goals in total, actions are still needed on four and a half goals, which are related to care, treatment and protection of water resources, as well as the impact of these actions on other ecosystems and living beings.

Discussion

The conception of hydrosocial territory allows to reveal and analyze the relationship that occurs between society and nature, which according to Sandoval (2017) is a perspective to explain the inseparable social and natural imbrication in the spaces where human activities are based.

In this regard having water services is an essential task for achieving the other 17 sustainable development objectives, especially that the water resource is vital to humans. Despite the difference in volumes assigned to the different social actors found in Coatepec Harinas, at the moment there have been no problems due to distribution, access, assigned volume that represent risks in continuity and in possible outbreaks of conflict between social actors or with community authorities in the case of water. Within the concept of hydrosocial territory, three dimensions are presented in which social activity, hydraulic work and the guidelines through which order between actors is maintained stands out (Damonte, 2015).

The relationship between the importance of objective six and the hydrosocial territory that is the subject of the study is manifested in the results

found, in which social actors with fewer resources: UR and small producers have fewer opportunities. If technology and sustainable development of their productive activity is compared to companies, it in turn exposes the concordance in the lack of services related to sanitation and efficient use of water resources.

Therefore, the use of water in the municipality should have the priority to obtain economic resources, as the issues of contamination, treatment, efficient use of water resources are still neglected, which leads to a negative impact on ecosystems related to water, including forests, mountains, wetlands, rivers, aquifers and the social actors of the hydrosocial territory, which at the same time reflects a territoriality destined to survival and economic development.

Bibliography

Boelens, R., Hoogesterger, J., Swyngedouw, E., & Vos, J.y. (2016). Hydrosocial territories: a political ecology perspective. *Water International*, 41(1), 2–14.

Capel, H. (2016). Las ciencias sociales y el estudio del territorio. *Biblio 3W. Revista Bibliográfica de Geografía y Ciencias Sociales*, XXI(1,149). Retrieved from: http://www.ub.es/geocrit/b3w1149.pdf (access: 11.10.2020).

Damonte, H.G. (2015). Redefiniendo territorios hidrosociales: control hídrico en el Valle de Ica, Perú (1993–2013). *Cuadernos de Desarrollo Rural*, 12(76), 99–134. Doi.10.11144/Javeriana.cdr12-76.rthc.

Delaney, D. (2005). *Territory: a short introduction*. London: Blackwell Publishing.

Duarte-Abadia, B., Boelens, R., & Roa-Avedaño, T. (2015). Hydropower, encroachment and the repatterning of hydrosocial territory: The case of Hidrosogamoso in Colombia. *Human Organizatión*, 74(3), 243–254.

Grupo Aduar (2000). *Diccionario de Geografía Urbana, Urbanismo y Ordenación del Territorio. Barcelona, España*: Ariel Referencia.

Hernández, B.C. (2018). El Macizo Colombiano como territorio hidrosocial (1990–2018). *Revista Controversia*, 210, 203–242.

Naciones, U. (2018). La Agenda 2030 y los Objetivos de Desarrollo Sostenible: una oportunidad para América Latina y el Caribe (*LC/zG. 2681-P/Rev. 3*). Santiago.

Real Academia Española (2019). Diccionario de la lengua española (ed. R.A. Española). Retrieved from: dle.rae.es: https://dle.rae.es/territorio (access: 11.10.2020).

Registro Púlico de Derechos de Agua (2020). Base de datos del REPDA. CONAGUA, México. Retrieved from: https://app.conagua.gob.mx/Repda.aspx (access: 7.11.2020).

Rodríguez de Francisco, J.C., & Boelens, R. (2016). PES hydrosocial territories: De-territorialization and re-patterning of water control arenas in the Andean highlands. *Water International*, 41(1), 140–156.

Rodríquez, S.A. (2017). Configuración hidrosocial: ¿paisaje, territorio o espacio? *Waterlat Gobacit Network, Working Papers. Tematic Area Series – Ta*, 4(3), 27–41.

Sandoval, A. (2017). Exploración de las contribuciones del enfoque "hidrosocial" a los estudios de caso sobre agua. *Waterlat-Gobacit Network Working Papers*, 4(3), 16–26. Doi:10.5072/zenodo.167124.

Sistema de Naciones Unidas en México (2020). Marco de Cooperación de las Naciones Unidas. México: Naciones Unidad México.

Unidad de Riego de la Comunidad de Ixtlahuaca de Villada (2019). Comité de la Unidad de Riego. Municipio de Coatepec de Harinas del Estado de México. Trabajo de campo.

Abstract

Objective six of sustainable development 2030: characterization in hydrosocial territory in the south of the State of Mexico

Objective six has as a priority "to guarantee the availability, sustainable management of water and sanitation for all". This is an important human right, yet, there are millions of people who have difficulties in accessing basic services related to water. Such is the case of the equitable and fair distribution of volumes of liquid among the different social actors, which are found in the so-called hydrosocial territories.

The concept of hydrosocial territory under the interaction between nature and society is represented by the water element and the human being. This relationship sets the standard for interrelationships marked by various sociocultural manifestations, as well as hydraulic work, regulations and agreements that make it constant, durable and dynamic. Human action encourages the formation of hydrosocial territories in which the different social actors seek access and control of water.

In this sense characterizing a territory as hydrosocial concerns the investigation of the relationships between three elements; water, territory and society. The latter being the one that develops economic activities, based on water resources, through the infrastructure in the municipality of Coatepec Harinas, in the State of Mexico.

The objective of the work is to present the characterization of the hydrosocial territory in which the forms of social organization presented by small entrepreneurs, producers and irrigation units that carry out agricultural and floricultural activities using the water resource are described and with this they have built a territoriality and the configuration of the hydrosocial territory.

Keywords: water, social actors and territoriality

Industrialization of the Amazon, a dialectical antagonism

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> The antagonism between the proletariat and the bourgeoisie will remain as a class struggle which, brought to its greatest degree of tension, is a complete revolution.
>
> Karl Marx

Introduction

A photograph that shows a desolate and desert landscape circulates social media and a question is asked if it is a landscape of the Middle East or the Sahara desert. However, it is an area in the interior of the Amazon, with soils degraded by monoculture, which is not surprising for those of us who live in these latitudes. Although others see it as a business opportunity, it is the curse of poor countries and populations far from the centres of power, as other people believe that they are the owners of these lands and the resources possessed against the true owners of the land. The method is heuristic, hermeneutical and deductive, and the study area is the Amazon at a general level with some examples in the case of the Bolivian Amazon in particular.

Conceptualizing and contextualizing the Amazon

The Amazon is one of the largest tropical ecosystems in the world, occupying an area of 9,869,344 km^2. It occupies the territories of Brazil, Colombia, Ecuador, Peru, Bolivia, Venezuela, Suriname, Guyana, French Guiana. Of all that surface, 75.7% corresponds to forest, 8.1% to non-forest natural formation, 13.4% to agricultural, 0.9% are areas without vegetation (urban) and 1.9% are water bodies[1].

[1] https://amazonia.mapbiomas.org/

"Of the 35.5 million inhabitants that the Amazon has – indicated the RAISG[2] in 2019 – approximately 1.7 million people belonging to some 375 indigenous groups live in approximately 3,344 indigenous territories and 522 protected natural areas (ANP). Their territories cover almost a third (30%) of the land surface of the region. Together with the ANPs (22%) they protect more than half (52%) of the Amazonian forests" (guardiana.com.bo, 2020).

According to the same source, "Between 2000 and 2018, the advance of deforestation in the Amazon accumulated the loss of 513,016 km^2 of native forest, a territory equivalent to the surface of Spain, a reduction of 8% of the total forest area from the year 2000 (6,381,275 km^2). The forest loss trend for the entire Amazon is strongly influenced by the situation in Brazil, which contains 62% of the territory, and comprises 83% of deforestation, 425,051 km^2 in these 18 years of analysis. While Bolivia with 8% and Peru with 11% of the Amazon territory, represent 6% and 4% of deforestation, 31,878 km^2 and 22,875 km^2 respectively".

Why a dialectical antagonism[3]

There is talk of a dialectical antagonism because it opposes two different positions. On the one hand, the conservationist, which does not exhaust the forest resources even though it uses them, but in terms of Sustainable Development, uses them without exceeding the carrying capacity of ecosystems allowing their use even by future generations.

On the other hand, the "developmentalist" position, which sees the Amazon as an inexhaustible source of natural resources, capable of generating wealth and which is also an empty space, without owners, without inhabitants, without threatened fauna, whose sole purpose is serving extractivist interests, without being accountable to anyone, or paying taxes, and even less benefiting or leaving royalties to local populations. The worst of all is that this is done with the permissiveness of many governments or even their sponsorship, such as that of Jair Bolsonaro's Brazil, or the lack of interest in putting a stop to these overwhelming activities by other governments.

For this reason, it is important to ask ourselves if this is really the development that is desired for this ecological region, and if the very concept of "development" is correctly formulated. Perhaps from this antagonistic dialectic many more ideas can be given to reformulate not only the concept, but rather

[2] Red Amazónica de Información Socioambiental Georeferenciada, https://www.amazoniasocioambiental.org/es/.

[3] Contemporary capitalism generates all kinds of imbalances and critical areas: ecological crises, marginalization and unemployment, unevenness in the development of different sectors of the economy, imperialist exploitation, etc. This means that the antagonistic points are going to be multiple and that any construction of a popular subjectivity will have to start from that heterogeneity (Laclau, 2006; in Retamozo and Stoessel, 2014).

the actions that are carried out in this territorial setting. In terms of dialectical antagonism, there is much more material for discussion, which for reasons of space unfortunately cannot be addressed in greater depth, but which fits perfectly into this discussion.

Amazonian wealth

The Amazon has extensive wooded areas rich in forest resources with an immense wealth of non-timber products ranging from fruits of the forest (cacao, well, majo, copoazú, cashew, carambola and many others), trees with essences and natural oils, medicinal plants, a diversity of fauna species and extensions of savannas and pastures, many destined for agricultural activity, not counting the presence of an infinity of Amazonian indigenous peoples whose presence dates from approximately 12,000 years BC.

It has paradisiacal ecosystems with sources of water that are considered potential for hydroelectric power and energy resources. In addition to this, it has large mineral deposits, including iron, aluminium, alluvial gold and hydrocarbons, which are considered strategic resources for the states, which consider this region as peripheral, an empty area and with potential to colonize, without taking into account the presence of ancestral indigenous populations and even many "protected areas".

The industrialization of the Amazon

Porto-Gonçalves (2018) points out that "If from the 60–70s we can talk about the beginning of the stage of megaprojects in the Amazon, we are now facing a megaproject that structures several megaprojects; a new project that Paul Little (2013) calls 'industrialization of the jungle' that will cause enormous ecological, cultural and political consequences, not only for the region, but for the entire planet".

Although the Amazon has an infinity of natural resources, we must ask ourselves if their exploitation is actually adequate and to what extent. Based on the concept of sustainability, the ideal is to use resources without exceeding the carrying capacity of ecosystems. However, this exploitation is not being carried out considering that these resources are finite and that at some point they will end.

For example, the extraction of alluvial gold in Amazonian rivers, which leaves huge huge amounts of mercury, poisons not only river ecosystems, but also ichthyofauna and the people who fish, not to mention the residents who consume river fish, as 78% of them have mercury levels above the reference values (Heck, 2014). Another aspect is the work in Amazonian illegal mining, in which even children are employed.

The concept of development in the Amazon. Misconceived or misused?

In addition to the voracity generated by the exploitation of natural resources in the Amazon, it has been seen as an engine of the misnamed development because it is not even seen as a process of economic growth for the region. Having exploited the resources, not a penny is left in the place but poverty and desolation.

Worst of all, as Little (2013) points out, is that "local peoples are not consulted before the megaproject is installed on the industrialization of their territories and the change in their adaptation mode. That is why they are forced processes of 'industrialization of the jungle'".

The interference of the IIRSA and the TIPNIS highway

Regarding road articulation, there are the projects of the Initiative for Regional Integration of South America (IIRSA) financed by BNDES and CAF[4], which seek to overcome the physical limitations existing within South America with a package of projects that were addressed by COSIPLAN[5] / UNASUR[6] and that apparently would be a great possibility of interoceanic trade flows.

A crude example that shows this initiative as part of a power that does not respect even the decisions of the states, is the highway that intended to cross a Protected Area in Bolivia, the National Park and Indigenous Territory "Isiboro Sécure" (TIPNIS), which in 2011 it was severely repressed[7] by the government of Evo Morales when it refused to allow the highway to pass through the nucleus of the Protected Area. Even the former vice-president Álvaro García Linera, in his book "Geopolitics of the Amazon" (2012), dared to deny that this highway had been part of the IIRSA axes, and that, in order to comply with it, he suppressed the law of intangibility of the Protected area.

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[4] Banco Nacional de Desarrollo Económico y Social de Brasil y Corporación Andina de Fomento.

[5] Consejo Sudamericano de Infraestructura y Planeamiento.

[6] The Union of South American Nations is an intergovernmental organization with international legal personality, made up of Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Surinam, Uruguay and Venezuela (https://parlamento-mercosur.org/).

[7] On September 25, 2011, indigenous Bolivians participated in the VIII march in defense of TIPNIS: Indigenous Territory and Isiboro-Sécure National Park. There was a moment when the march stopped being peaceful, and it was when police officers attacked them and intervened in the indigenous camp in the community of San Miguel de Chaparina, Beni. The objective that moved them at that time was, and continues to be, the defense of their natural habitat and the demand for respect for their uses and customs (Cosecha Roja, 2013).

This text also accepts that the coca leaf monoculture producers are settled in that place and that they voluntarily defined a "red line" that they decided not to cross.

In this context, an "existing ambiguity in state management, a double discourse of the political process carried out in Bolivia and led by Evo Morales, should be pointed out. It is no longer surprising that the government acts with two faces, when it refers to public opinion: on the outside it is respectful of mother earth 'Pachamama', inside it is highly developmentalist with 50 years behind the developed countries" (Sandoval, 2017).

Looking for other sources of fuels

And it is not the only case. Later, due to the decrease in the amount of hydrocarbon reserves in Bolivia, exploration in Protected Areas was authorized by Supreme Decree No. 2366, and against article 30 of the Political Constitution of the Bolivian State, they began activities without prior consultation with the indigenous people who inhabit these spaces. The regrettable thing is that the efforts of these initiatives were in vain because to date no positive results have been achieved from these explorations, as in the Madidi National Park.

Faced with this failure, it is betting on fracking to extract unconventional gas, which in the same way will affect the ecosystems of the region through the use of highly invasive extraction techniques, despite scientists and environmentalists warn of its high environmental impact (Jemio, 2018).

In the same way, the Amazon is being deforested not only to produce food both in livestock and in agriculture. The increase in areas to produce biofuels was proposed through an "Agricultural Summit" in 2015, which abolished the sanctions against deforestation, and which expanded the quotas for agro-industrial production with the introduction of Genetically Modified Organisms (GMOs), such as soybeans, corn, sugar cane and cotton (Tierra, 2015), despite opposition from environmental sectors and producers in the region.

Expired projects in the XXI century

In the 1970s, there was the La Paz Development Corporation, which among its projects for the development of the department proposed the construction of a hydroelectric dam in the "Bala" region and a sugar plant in the San Buenaventura area. Well, 50 years later and perhaps due to the lack of development initiatives, during the government of Evo Morales it was decided to dust off those folders and first start the construction of the sugar plant, with an investment of almost US $ 300 million (similar to the cost of the Tupak Katari satellite, both built and put into operation by Chinese companies). This sugar plant has the capacity to process 7 thousand tons of sugar cane

a day, although "unviable based on the average yield of the cane production and the sucrose contents" (Los Tiempos, 2016). The plant was built without the productive capacity for these inputs existing in the area, which is forcing large areas to be deforested for the planting of sugar, despite the existence of companies and areas traditionally producing sugar in our country.

Regarding the construction project of the "El Bala – Chepete" dams, its high negative impact has been demonstrated with many environmental impact studies. The dams can affect the entire region of the Beni river in the north of the department of La Paz, threatening to displace more than 5,000 indigenous people from the Amazon, "in an area larger than the municipality of Madrid". It "will displace native communities and may end the dream of developing eco-community tourism in the area" (El País, 2017), and, with the return to power of the Morales political party, it will surely become a reality, despite the rejection of the whole population. Nevertheless, together with the Rositas hydroelectric project, it "is an emblematic project of the Government to turn Bolivia into an energy export centre to the rest of South America" (El País, 2017). However, many studies have shown that the cost of producing energy will be much higher than the cost that is expected to be recovered from its sale to neighbouring countries such as Brazil and Argentina. Not to mention climate change that is already a reality in the Amazon region and the trend pointing to greater and longer droughts (Marengo et al., 2018) that will be aggravated by this type of infrastructure, which instead of benefiting, will mainly affect the small and medium producers.

And the sustainability?

Depending on the place where you look, development projects, including roadways, can mean an advantage or a weakness. For example, the intention to build a series of roads from the interior of the Amazon will necessarily mean the depredation of forests, fragmentation and damage to ecosystems and local populations and, of course, a threat to their ways of life. Seen from outside or from the producing regions, they will be inter-oceanic ties that will allow the flow of goods, shortening times and distances. However, the role of incorporating local domestic production has not been adequately negotiated to benefit from these flows (at least not from Bolivia).

Conclusions

The high ecosystem fragility of the Amazon, which to date has been a mainly economic objective for the authorities on duty, is evident.

Incorporating development megaprojects, knowing their infeasibility, will mean their rapid destruction of the existing high biodiversity and culture.

It is not necessary to overexploit natural resources, because although there is a great wealth of them, fully sustainable development projects can be undertaken that mainly benefit local populations.

The new development paradigm in the context of climate change forces us to be creative and aware of the planet, thinking mainly of future generations.

Bibliography

Bolivia (2015). *Decreto Supremo 2366*. La Paz: Gaceta Oficial de Bolivia.

Cosecha Roja (2013). Bolivia: dos años después de la masacre de Chaparina sigue la impunidad. En: http://cosecharoja.org/bolivia-dos-anos-despues-de-la-masacre-de-chaparina-sigue-la-impunidad/.

El País (2017). La hidroeléctrica que amenaza a 5.000 indígenas bolivianos. Retrieved from: https://elpais.com/elpais/2017/09/05/planeta_futuro/1504563761_414612.html.

García-Linera, A. (2012). *Geopolítica de la Amazonía: poder hacendal patrimonial y acumulación capitalista*. La Paz: Vicepresidencia del Estado, Presidencia de la Asamblea Legislativa Plurinacional.

guardiana.com.bo (2020). 23 mapas y 30 expertos nos muestran cómo la Amazonía está hoy bajo presión. Retrieved from: https://guardiana.com.bo/iniciativas/amazonia-bajo-presion/.

Heck, C. (2014). *La realidad de la minería ilegal en países amazónicos*. Lima: Sociedad Peruana de Derecho Ambiental.

Jemio, M. (2018). Alertan sobre los riesgos ambientales frente al uso de *fracking* en Bolivia. Retrieved from: https://www.laregion.bo/alertan-sobre-los-riesgos-ambientales-frente-al-uso-del-fracking-en-bolivia/.

Laclau, E. (2006). *¿Por qué construir un pueblo es la tarea principal de la política radical?* Cuadernos del Cendes, 23(62), Universidad Central de Venezuela.

Little, P. (2013). *Megaproyectos en la Amazonía. Un análisis geopolítico y socioambiental con propuestas de mejor gobierno para la Amazonía*. Lima: Red Jurídica Amazónica (RAMA)-Articulación Regional Amazónica (ARA) y Derecho, Ambiente y Recursos Naturales (DAR).

Los Tiempos (2016). Ya se sabía de riesgos de azucarera. Retrieved from: https://www.lostiempos.com/actualidad/economia/20160730/ya-se-sabia-riesgos-azucarera?page=3.

Marengo. J.A., Souza, C.M. Jr, Thonicke, K., Burton, C., Halladay, K., Betts, R.A., Alves, L.M. and Soares, W.R. (2018). Changes in Climate and Land Use Over the Amazon Region: Current and Future Variability and Trends. Frontiers in Earth Science 6:228. Doi:10.3389/feart.2018.00228.

Porto-Gonçalves, C. (2018). Amazonía: encrucijada civilizadora. Tensiones territoriales en curso. La Paz: Instituto para el Desarrollo Rural de Sudamérica; CIDES-UMSA.

Retamozo, M. y Stoessel, S. (2014). El concepto de antagonismo en la teoría política contemporánea. *Estudios Políticos*, 44, Instituto de Estudios Políticos, Universidad de Antioquia, p. 13–34.

Sandoval Y. (2017). Danza de la Geopolítica del TIPNIS. In: Y. Sandoval y J. Nuñez, Geografías al servicio de los procesos de paz: análisis global, reflexión y aporte desde el contexto latinoamericano. La Paz: Instituto de Investigaciones Geográficas, Universidad Mayor de San Andrés.

Tierra (2015). Los acuerdos de la Cumbre Agropecuaria se convierten en tres decretos y seis proyectos de ley. Retrieved from: http://www.ftierra.org/index.php/transformaciones-agrarias-y-rurales/558-los-acuerdos-de-la-cumbre-agropecuaria-se-convierten-en-tres-decretos-y-seis-proyectos-de-ley.

Abstract

Industrialization of the Amazon, a dialectical antagonism

The Amazon as everyone's ecosystem, presents a breadth of wealth of natural resources beyond simple tropical forests, and although it is pointed out that it is a world heritage site, not everyone makes decisions about its use. In fact, its industrialization from its "colonization" is greatly affecting the entire planet as the agricultural frontier has been constantly expanding for the purposes of agribusiness, biofuels, livestock and transgenic agriculture. In antagonistic opposition there is the idea of industrializing the Amazon rainforest, reducing the great breadth and variety of ecosystems, homogenizing production systems, reducing diversity and generalizing the extractive agribusiness under a capitalist and globalizing development model, without considering the environmental importance of this great global ecosystem. This presentation aims to dialectically analyse this antagonistic model in order to determine to what extent the sustainability of this exploitative model can be guaranteed and if it is actually the model that is needed in this millennium to guarantee the socio-natural subsistence of this great world ecosystem.

Keywords: Amazonia, industrialization, dialectical antagonism, sustainable development

Heat sources in the Eastern region of Bolivia between 2000 to 2019

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Introduction

Forest fires are produced by the combustion of area biomass and constitute one of the most serious ecological problems (Heras et al., 1991). They influence the structure and functioning of ecosystems due to the release of gases (carbon dioxide, methane and nitrous oxide, carbon dioxide), sulfur, particulate matter (PM2.5 and PM10), aerosols (Castillo et al., 2003; Balde, Vega, 2019), and more than 100 polyaromatic hydrocarbon compounds (PAH). Additionally, forest fires cause an increase in ambient temperature (Sandoval et al., 2019). On the other hand, heat waves affect the health of the most vulnerable population (children, elderly, those suffering from chronic cardiovascular or respiratory diseases and others), animals, and plants (García de Pedraza, 1988; Ballester, 2008).

Chacón (2015), based on data from wildfires registered by NASA from 2002 to 2013, found that the emissions produced in forest fires are transported through the air to areas that are distant from the emission source, causing an increase in the concentrations of different pollutants in the cities. Therefore, air pollution is not just a local problem but a regional one. Fuentes & Selaya (2011) refer to the fact that pollutants from forest fires travel hundreds or thousands of kilometers from the source. Venegas & Mazzeo (2016) show that wind and air turbulence act in these processes, these factors in turn are modulated by synoptic scale atmospheric disturbances Garreaud & Rutllant (2006).

In 2017, in Oruro-Bolivia, the Air Quality Monitoring network (MoniCA) registered the concentration of atmospheric pollutants in ten points situated in areas with different levels of vehicular traffic as well as different population density. The monitoring station located in Vinto's health post, which is the farthest from vehicular traffic in an area where population density can be considered as medium, presented the highest pollutant values in September, October and November.

In Table 1 the percentage of cases related to forest fires (heat sources) is indicated; for example, 64% of the cases related to maximum temperature is registered in October. Therefore, it can be deduced that air pollution came from other emission sources such as forest fires.

Table 1. Percentage of contamination cases related to maximum temperature in Oruro

Month	N° registered data	N° data over the limit: 100 $\mu g/m^3$	Percentage (%) of cases related to maximum temperature 90th percentile
Sep	11	2	18
Oct	11	7	64
Nov	12	5	42
***Law 1333 in Bolivia establishes a limit of 150 $\mu g/m^3$. Limit according to World Health Organization is 50 $\mu g/m^3$**			

Reference: Air Quality Monitoring network (MoniCA) database, 2017

The definition of a heat wave has two components, one is the cut-off temperature (or the maximum temperature), which classifies hot days, and the other, the degree of persistence of hot days (Folland et al., 1999, quoted by Yagüe et al., 2006). The cut-off temperature was identified with the 90th percentile of each series and four consecutive hot days were taken as the degree of persistence of extremely hot days (Robinson, 2001, quoted by Yagüe et al., 2006).

A great majority of the studies have focused on the relationship between forest fires and extreme temperatures, heat waves and air pollution in different regions, but there are very few studies relating the sources of emission (heat sources, pollutants), the form of transport (atmosphere) and direct receptors (population of our species, animals and plants) and indirect sources, such as the maximum thermometers from meteorological stations. Considering that the World Meteorological Organization – WMO (2020) relates the maximum temperature (38ºC) recorded in Verjoyansk (Russia, Eastern Siberia) on June 20, 2020 with a heat wave accompanied by an increase in forest fires, the aim of this work is to explore the relationship between the forest fires that occurred between 2000 and 2019 in the eastern region of Bolivia and the maximum temperatures and heat waves registered in Oruro in the same period.

Therefore, the main hypothesis to test in this work is: "The greater the number of fire sources in the eastern region of Bolivia, the higher the maximum temperature values in Oruro".

Method

- **Location and characteristics of the area of study**

Oruro is a city in the western region of Bolivia, specifically in the central highlands at 17º58'00''LS and 67º07'00''LO with an altitude of 3735 m (Figure 1).

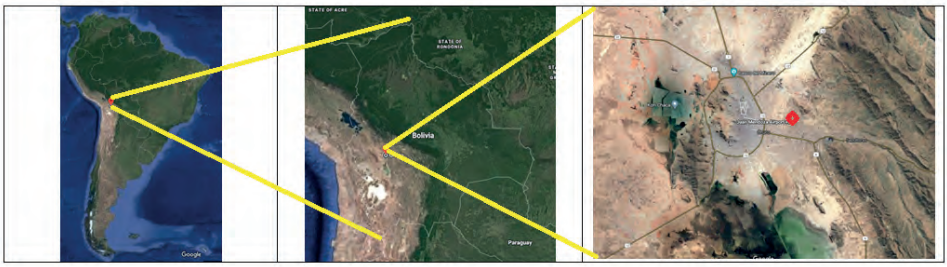


Figure 1. Physiographic location of Oruro's meteorological station

Source: Google Earth

The thermodynamic factors that influence the central highlands region (Oruro) are high and medium levels. At high levels (250 mb. = 12,000 m. altitude), the Alta de Bolivia and the Subtropical Jet. At medium levels (500 mb. = 5,800 m. altitude), troughs and ridges. Three air masses influence the study region: continental tropical (Amazon + Atlantic anticyclone), maritime subtropical (Pacific anticyclone) and maritime polar (low migrant from the southern polar region). Also, there is an influence of three centers of dynamic action: two of high pressure, one over the Pacific Ocean, the other over the Atlantic Ocean and a low pressure center that migrates from the Pacific Ocean to the Atlantic Ocean.

A low pressure center of thermal action which is part of the inverted trough, located on the continent (NET), mainly in summer, produces unstable weather and therefore formation of clouds and precipitation. In reference to surface winds (1.5 m), there is a predominance of winds from the southeast, followed by the west and east as has been observed over 35 years (1975-2010) (Miranda et al., 2020).

The maximum temperature series-TM come from the meteorological station located at Juan Mendoza's airport in the city of Oruro (Figure 1). This station is endorsed by the World Meteorological Organization – WMO, the maintenance and calibration are carried out by the staff of the Airport Administration and Auxiliary Services to Air Navigation – AASANA, the data is protected and distributed by the National Meteorology and Hydrology Service – SENAMHI.

The maximum thermometer is read at 8:00 am. In the study period, 183 cells with no data were identified, 80% of these cells correspond to August, September, October, November, and December of 2017.

The series of heat sources (heat sources – FC) above 47ºC are registered and analyzed by the Center for Weather and Climate Studies – CPTEC of the National Institute for Space Research – INPE of Brazil based on satellite images: NOAA, GOES, AQUA, TERRA and METEOSAT. The information is from 2000 to 2019 (20 years) covering 240 monthly data. In this case, it should be noted that a heat source is not necessarily considered as a fire or a fire source.

• **Description of procedures**

The procedures for analyzing the maximum temperature data – TM and heat sources – FC, were:

- For the quality control of the data series, we used exploratory graphical analysis (time series graphs, box plots, double mass graphs, and normality graphs recommended by Castro & Carvajal (2010). A confirmatory analysis was then carried out with the non-parametric Mann-Kendalls test, in order to analize the trend of the series and the student's test for the homogeneity of these series according to the recommendations of Le Goulven (1988), Puertas et al. (2011) & OMM (2012).
- Application of the parameters of descriptive statistics: central tendency, dispersion, position and shape measures. Emphasis was placed on box plots and the identification of the 90th percentile (Wanderson et al., 2015; Rusticucci, Barrucand, 2000; Salinas et al., 2006) for the extreme values of TM and FC.
- Application of the Hypothesis test for the relationship between the TM and FC series for the months of September, October and November. This tests were based on the main hypothesis: "The greater the number of fire sources in the eastern region of Bolivia, the higher maximum temperature values are recorded in Oruro" with a significance level of $\alpha = 0.05$ (5%).
- Analysis of the assumptions of the linear regression model for prediction and forecast: normality with the Kolmogorov-Smirnov test and Q-Q graph tests (Romero, 2016) and independence with Autocorrelation. Each test is accompanied by its hypothesis test with a level of significance of $\alpha = 0.05$ (5%).
- Application of Spearman's rho correlation (non-parametric).

Results and discusion

Exploratory analysis of the series

In all 12 TM series (Table 2), the minimum and the maximum values were recorded in September and December respectively. The highest temperature occurred in November (21.6ºC) while the lowest temperature occurred in July (16.6ºC). A positive symmetry was shown in February (above the average), for the rest of the months the symmetry was negative (below the average). The greatest variation occurred in January (2.59ºC). The least variation is found in April (1.61ºC).

Although the years from 2000 to 2010 overlap, the averages vary from 0.5 to 2.1ºC. The data about heat sources registered by INPE can be compared with data published by the Ministry of Environment and Water in Bolivia. This Ministry has daily information from 2001 to the present, with some

Table 2. Statistical parameters of the 12 series of maximum temperature (°C) at Juan Mendoza's meteorological station from 2000 to 2019 in Oruro

Month	n	Mimimum	Maximum	Rank	Median		Mean	Mode	Asymmetry		Kurtosis		Standard deviation	Variance
					Statistical	Error deviation			Statistical	Error deviation	Statistical	Error deviation		
JAN	20	16,50	21,50	5,00	19,1	0,274	19,1	18,0	0,015	0,512	–0,230	0,992	1,225	1,501
FEB	20	17,20	21,00	3,80	19,1	0,253	19,3	17,6	–0,126	0,512	–1,111	0,992	1,133	1,284
MAR	20	17,80	23,30	5,50	19,8	0,292	19,5	21,0	0,906	0,512	1,226	0,992	1,307	1,709
APR	20	18,60	20,80	2,20	19,7	0,150	19,7	18,6	–0,243	0,512	–0,857	0,992	0,672	0,451
MAY	20	16,80	19,40	2,60	17,8	0,142	17,7	18,0	0,804	0,512	0,824	0,992	0,637	0,405
JUN	20	14,90	18,30	3,40	16,6	0,235	16,6	16,0	0,062	0,512	–1,070	0,992	1,052	1,107
JUL	20	14,00	19,50	5,50	16,6	0,293	16,9	17,1	–0,117	0,512	0,419	0,992	1,308	1,712
AUG	20	16,10	15,50	3,40	17,9	0,220	17,8	17,3	0,044	0,512	–1,016	0,992	0,985	0,970
SEP	20	17,60	21,40	3,80	19,4	0,198	19,4	19,6	0,080	0,512	0,531	0,992	0,885	0,783
OCT	20	19,70	22,20	2,50	20,8	0,140	20,8	20,8	0,575	0,512	0,599	0,992	0,625	0,391
NOV	20	20,10	22,50	2,40	21,8	0,141	21,9	22,1	–1,451	0,512	1,893	0,992	0,629	0,395
DEC	20	19,00	22,40	3,40	20,8	0,233	21,2	20,4	–0,182	0,512	–1,201	0,992	1,040	1,082

Table 3. Statistical parameters of the 12 series of heat sources, from the INPE registry for Bolivia from 2000 to 2019

Month	n	Mimimum	Maximum	Rank	Median		Mean	Mode	Asymmetry		Kurtosis		Standard deviation	Variance
					Statistical	Error deviation			Statistical	Error deviation	Statistical	Error deviation		
JAN	20	49	322	237	175,4	18,06	180,0	180	0,007	0,512	–0,947	0,992	80,7	6512,5
FEB	20	37	395	358	111,5	18,35	86,0	84	2,536	0,512	7,304	0,992	82,1	6740,4
MAR	20	58	219	161	126,9	9,86	120,0	96	0,483	0,512	–0,413	0,992	44,1	1944,8
APR	20	13	23	10	224,0	33,37	211,9		1,270	0,512	1,480	0,992	149,2	22260,6
MAY	20	58	1448	1390	478,8	77,12	442,5		1,283	0,512	2,225	0,992	344,9	118956,0
JUN	20	175	2748	2573	1010,5	156,17	864,0		1,185	0,512	1,030	0,992	698,4	487762,6
JUL	20	395	6421	2026	2824,5	401,58	2600,5		0,448	0,512	–0,846	0,992	1795,9	3225256,8
AUG	20	2373	34574	32201	9276,9	1740,93	6513,0		1,968	0,512	4,898	0,992	7785,7	60617124,5
SEP	20	3942	30565	26623	12802,6	1791,74	9142,5		1,057	0,512	0,075	0,992	8012,9	64206566,4
OCT	20	1973	11757	9784	6233,1	631,04	6091,5		0,174	0,512	–0,497	0,992	2822,1	7964248,4
NOV	20	192	4412	4220	1713,8	243,04	1427,0		1,090	0,512	1,048	0,992	1086,9	1181351,6
DEC	20	9	27	18	399,4	65,47	331,0		1,756	0,512	4,412	0,992	292,8	85731,8

information gaps, and annual information from 2001 to 2014 (14 years) of "heat sources". The annual reports follow the same behavior as the INPE register, but on average, the values are 3.4 times higher, which means that Bolivia is registering more "hot spots" than INPE.

Figure 2 shows the monthly behavior of the maximum temperatures over 20 years. None of the 12 series shows a definite trend observed. Figure 3 shows outliners in the months of May, July, September, October, and November. Asymmetric data belongs to June, July, August, and October.

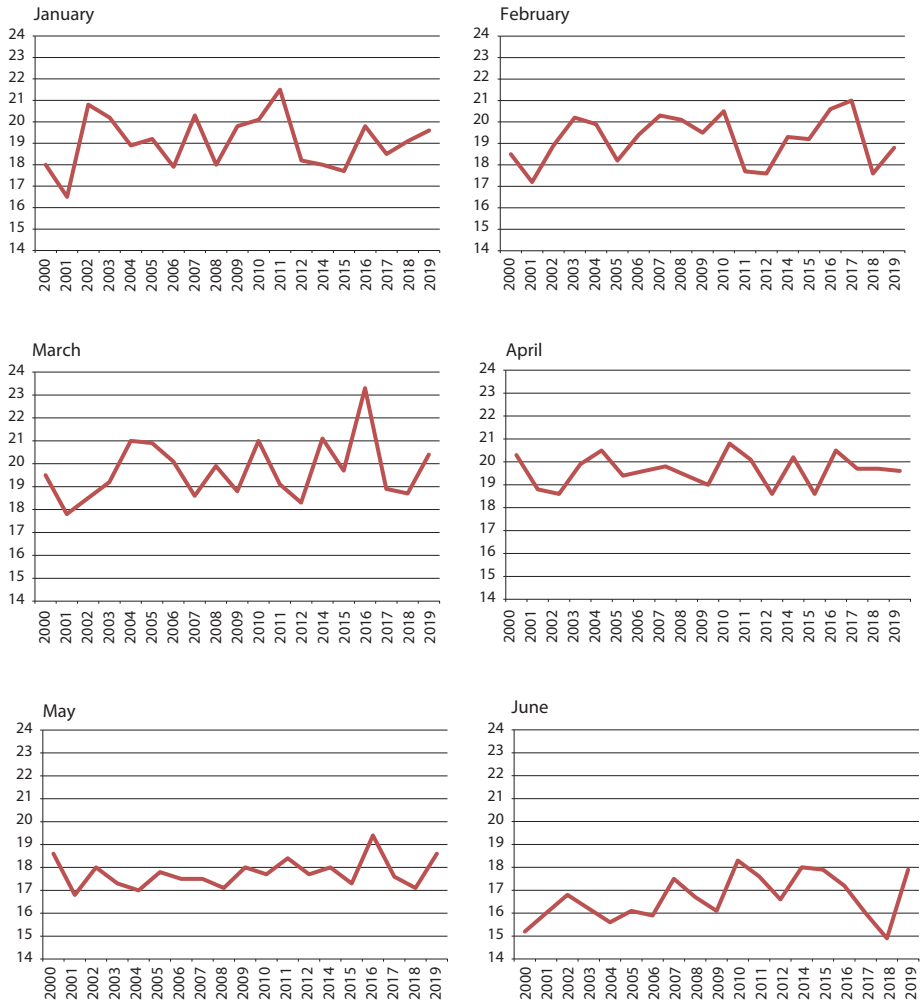


Figure 2. Maximum temperature time series in Oruro (2000–2019). Y axis – temperature (°C) and X axis – time (years)

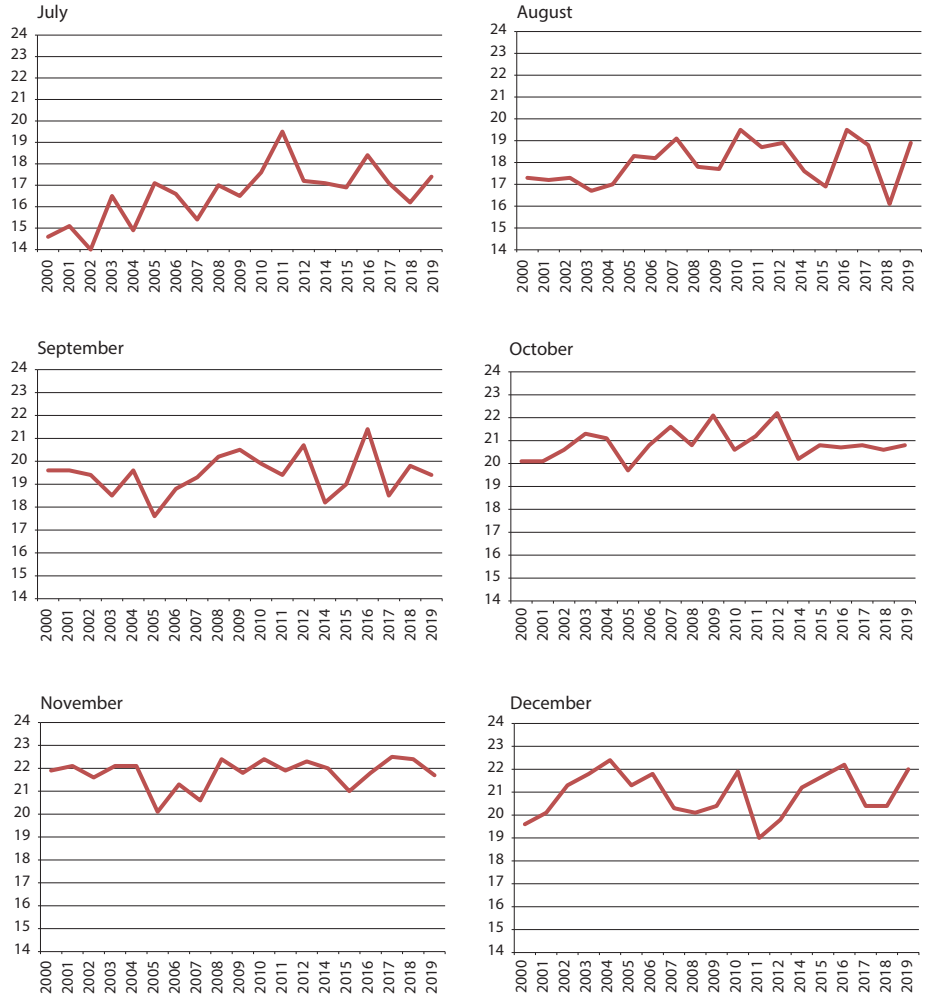


Figure 2. Maximum temperature time series in Oruro (2000–2019). Y axis – temperature (ºC) and X axis – time (years)

The interpretation of the graphs and calculations indicate that the 12 TM series do not show a tendency to increase in temperature. However, Andrade et al. (2017) demonstrated that the increase in TM in the central highlands is 0.40ºC. In this regard, Cohen et al. (2012) have observed that the global warming trend has slowed down and even stopped since the late 1990s. These authors indicate, on the basis of several studies made by other researchers, that there is an absence of a warming trend in the context of annual global temperatures, they indicate as an example that "the extratropical land surface temperatures of the northern hemisphere (NH) during the boreal winter show a systematic decrease in the warming trend to an almost neutral trend in recent times".

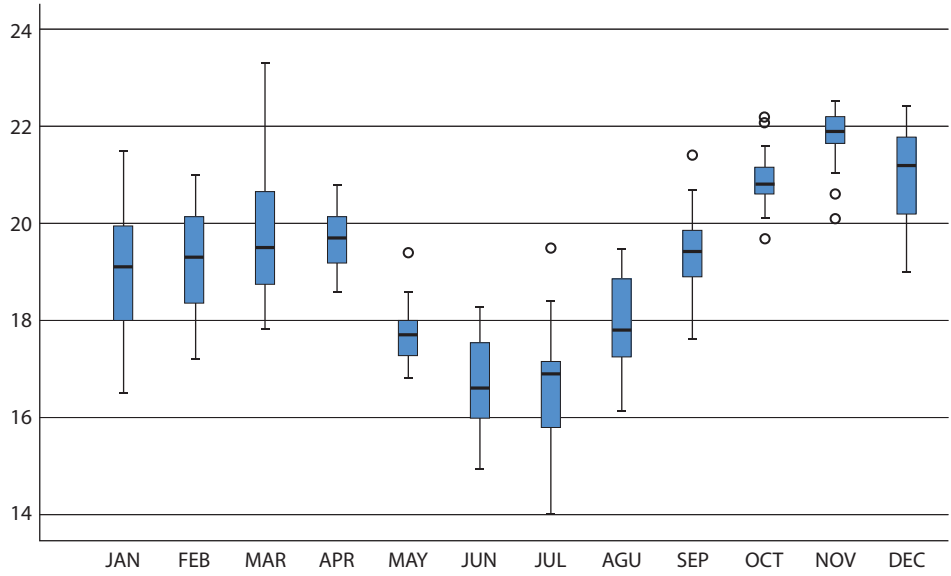


Figure 3. Box plot of maximum temperatures of the meteorological station in Oruro, Bolivia

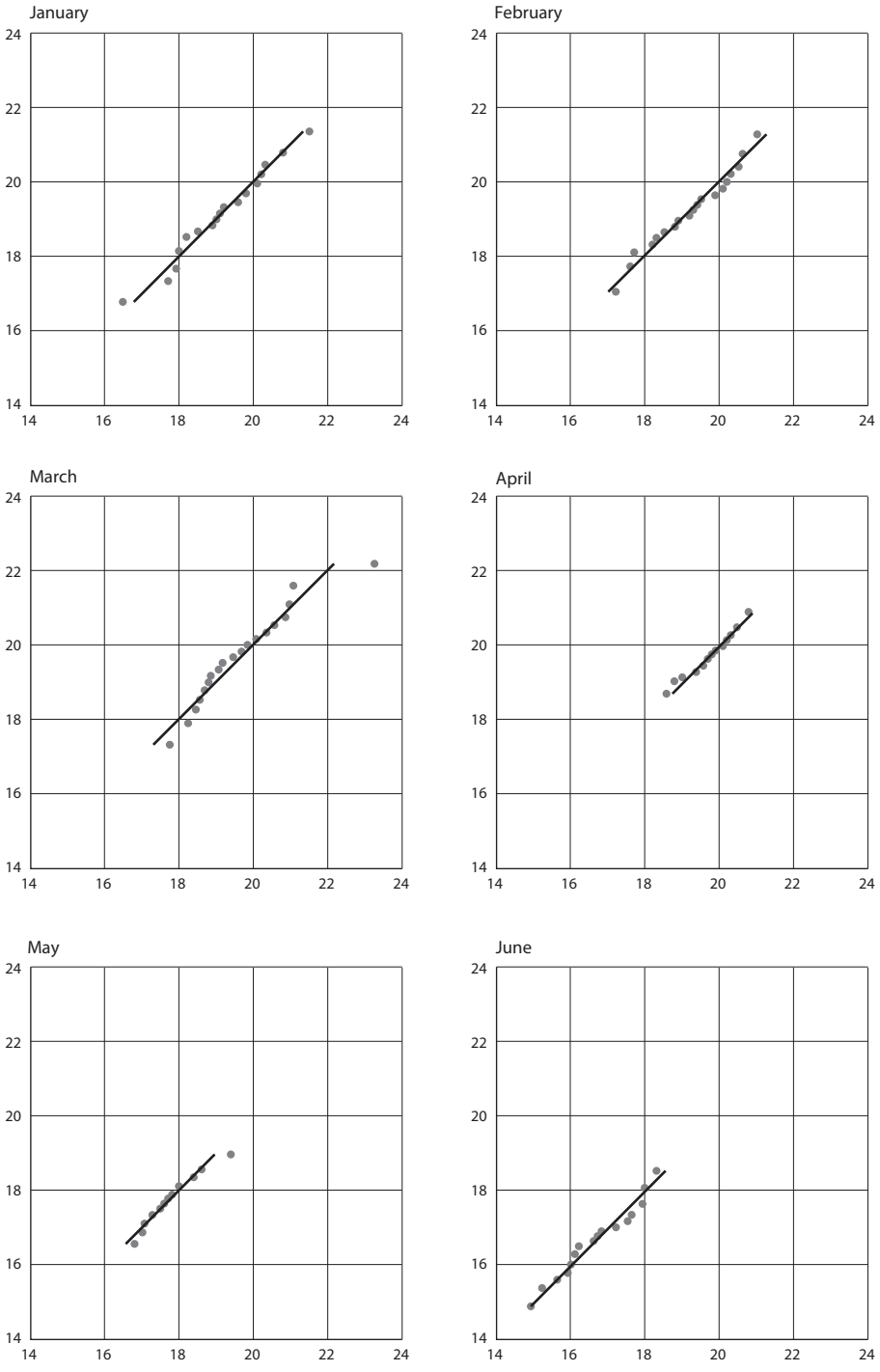
In this regard, Garret et al. (2013) recommend that linear models for the projection of temperatures should be replaced with non-linear models to include impacts at higher temperatures.

In the behavior of the 12 daily series of maximum temperature, an anomaly was found between 2016-2017, which according to (Miranda et al., 2020, in review), could be due to the influence of El Niño Costero – 2017.

Fluctuations above 23°C could be due to the strong solar radiation that reaches the surface, to the cloud cover, to particles suspended in the air that modulate the energy input (Andrade et al., 2017), to the entrance of cold fronts (Miranda, 2020; Barrucand et al., 2008) and the predominance of winds from the east and northeast in the study area (Miranda, 2020).

• **Assumption for the linear regression model**

– Normality. The graphs of the quantiles (Q-Q) show that for July and November the series do not come from a population with normal distribution, due to the fact that some data move away from the diagonal. In the remaining months, the values come from a population with a normal distribution (Figure 4). The hypothesis test of the normality of the series at a significance level of 5% and with the Kolmogorov-Smirnov test indicates that the series of January, February, and March have a normal distribution; the rest of the months differ from a normal distribution.


January
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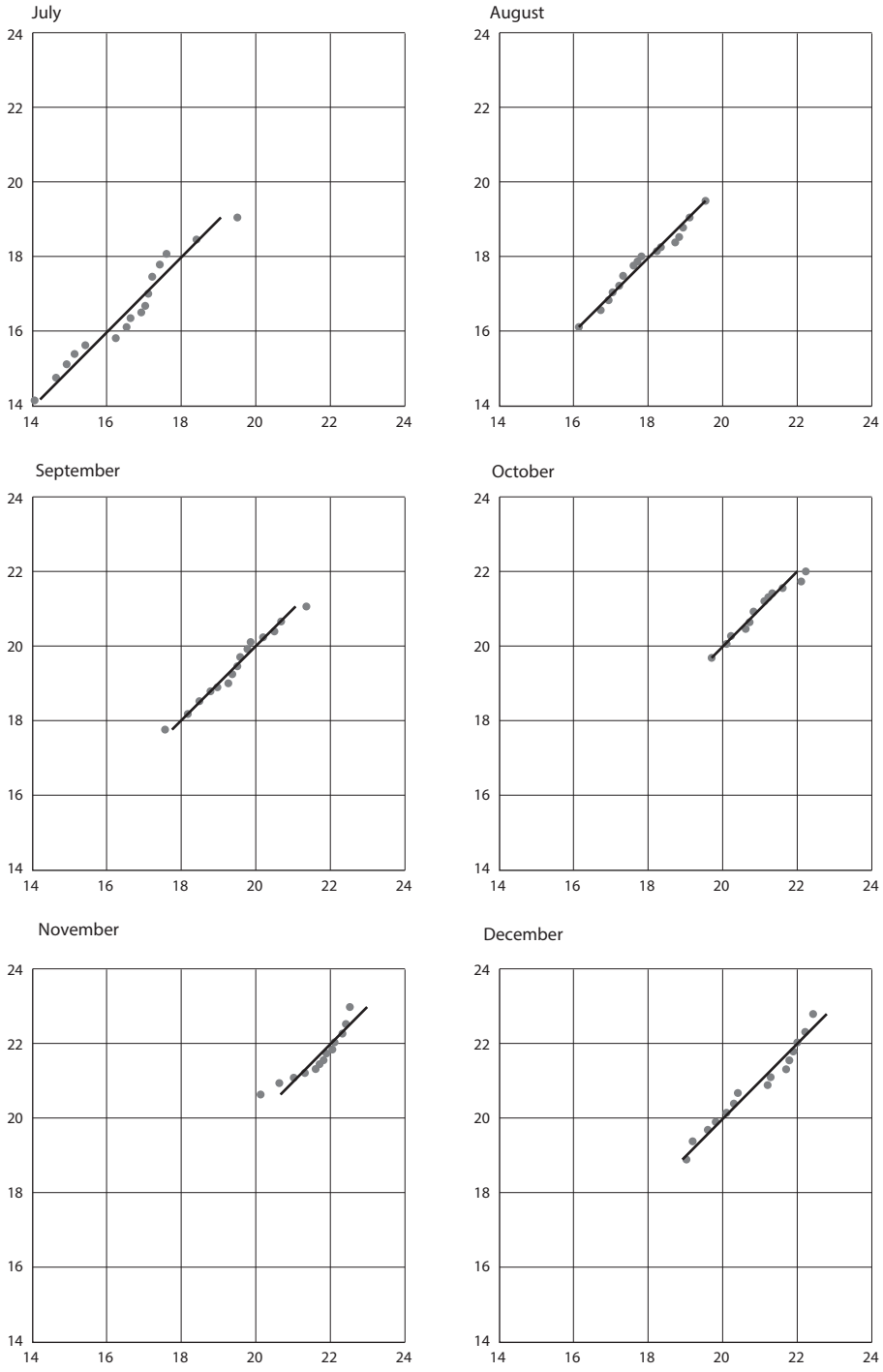
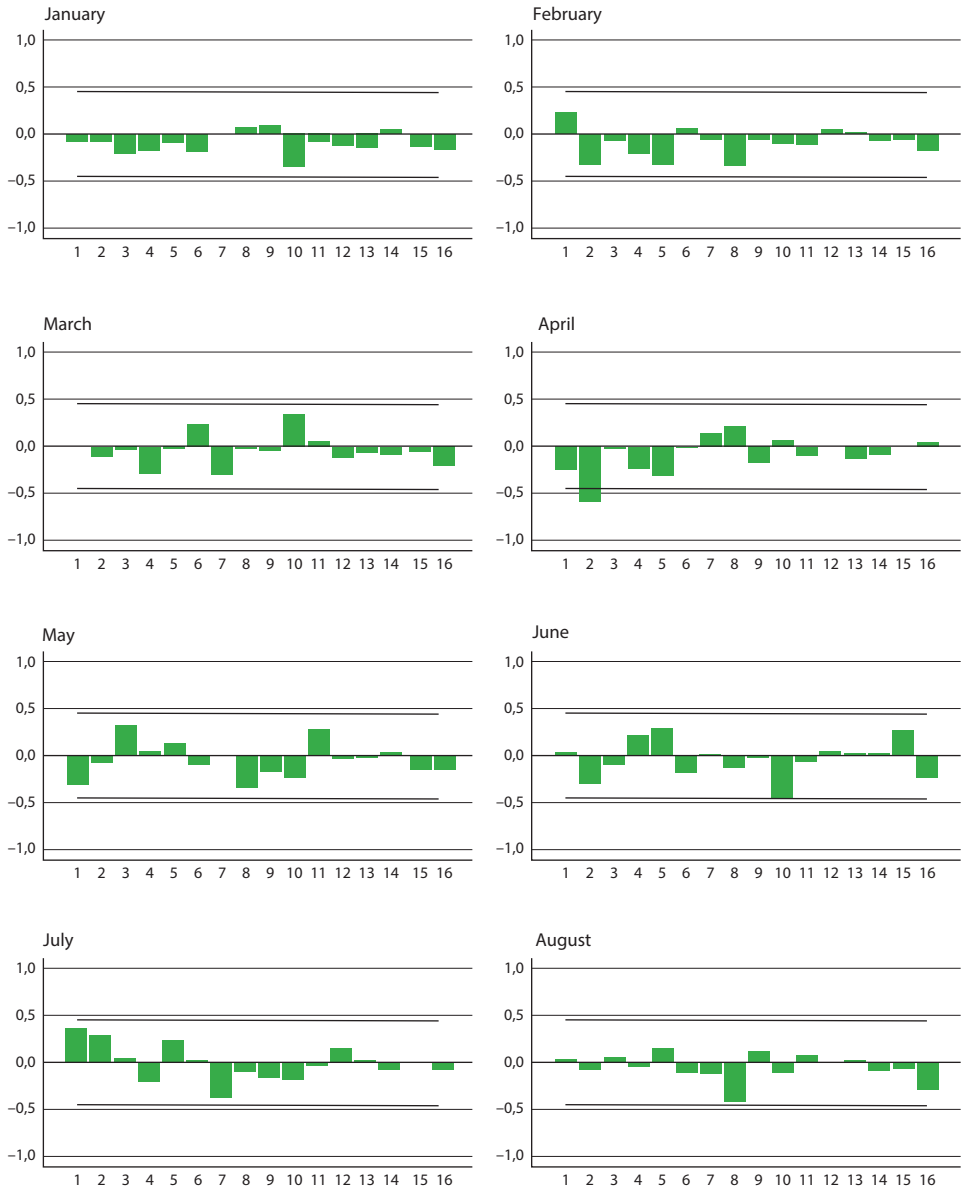


Figure 4. Normal Q-Q graphs are in the first column, the Y axis indicates the typical score that corresponds to the standardized normal distribution, the X axis shows the observed data from lowest to highest

– Independence – simple and partial autocorrelation. The simple and partial simple autocorrelation functions of the residuals indicate that there is no autocorrelation in any month, which means, there is no dependence between the data, directly, indirectly or totally. The maximum temperature in April depends on what has happened in the previous month (Figure 5).



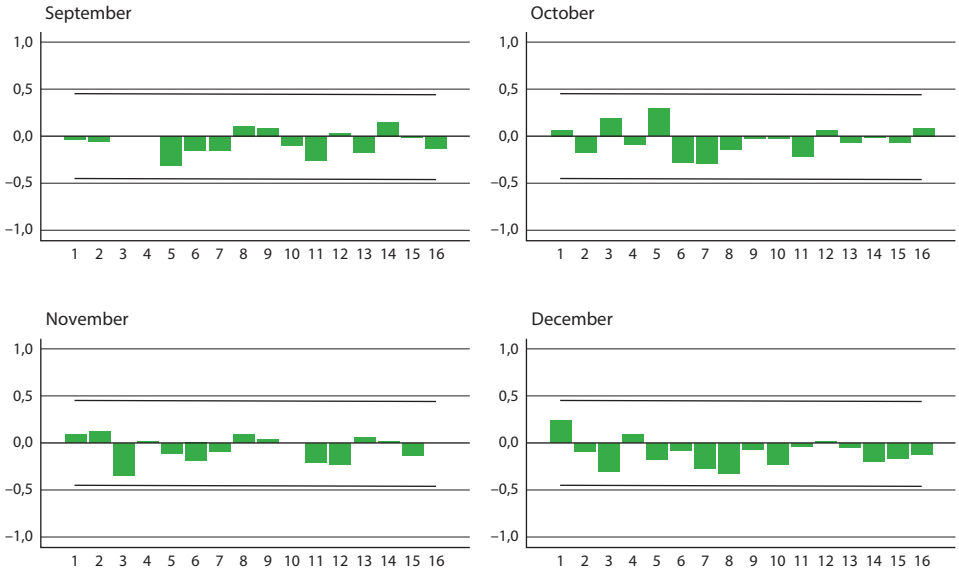


Figure 5. In partial autocorrelation graphs, the Y-axis indicates the correlation values ranging from –1 to +1, the X-axis is the lag number. The bars indicate the coefficient, and the extreme parallel lines indicate the upper confidence limit and the lower confidence limit

In reference to the tests of normality and independence of the series of heat sources (Table 3), with a level of significance of $\alpha = 0.05$ only January, March, July, October, and November respond to a normal distribution. In all series there is independence.

The hypothesis tests for the two assumptions (normality and independence) with a significance level of 5% for the types of series (TM and FC) indicate that the series do not respond to a normal distribution, except for a few months. In the case of TMs, none of the 12 series respond to the assumption of independence, but in the case of series of heat sources, the series are independent. Salinas et al. (2006) recommend that, in order to apply classical models (linear regression, correlation, among others), it must be verified that the series respond to the assumptions of normality, independence, among others, if not, non-parametric models must be used. Lévy & Varela (2006) emphasize the assumption of independence, and indicate that the series must be devoid of autocorrelation, which means that data in the series must not depend on their past values.

Table 4. P values calculated for normality and independence tests of the 12 series of heat sources

Normality test, Shapiro-Wilk					Independence test, Box-Ljung		
Month	Statistical	gl	P value (sig)	Interpretation	P value (sig) 1er.	P value (sig) 2do.	Interpretation
JAN	0,959	20	0,517	Normal distribution	0,147	0,707	Independence
FEB	0,701	20	0,000	No normal distribution	0,872	0,782	Independence
MAR	0,960	20	0,539	Normal distribution	0,813	0,522	Independence
APR	0,892	20	0,030	No normal distribution	0,547	0,663	Independence
MAY	0,894	20	0,032	No normal distribution	0,464	0,760	Independence
JUN	0,894	20	0,032	No normal distribution	0,894	0,987	Independence
JUL	0,945	20	0,300	Normal distribution	0,357	0,645	Independence
AUG	0,783	20	0,000	No normal distribution	0,746	0,881	Independence
SEP	0,871	20	0,012	No normal distribution	0,163	0,230	Independence
OCT	0,965	20	0,655	Normal distribution	0,346	0,634	Independence
NOV	0,913	20	0,074	Normal distribution	0,594	0,452	Independence
DEC	0,853	20	0,006	No normal distribution	0,894	0,983	Independence

- **Relationship between series**

Table 5 shows the correlation between the heat sources recorded in the eastern region of Bolivia and the maximum temperature recorded in Oruro, in April and August.

Table 5. Rho values and Spearman correlation interpretation

months	rho	P values	Interpretation
APR	0.596	0.006	There is a moderate relationship between heat sources and the maximum temperature – Oruro
AGO	0.460	0.041	There is a moderate relationship between heat sources and the maximum temperature – Oruro

Heat waves

Two variables, daily heat wave data and the monthly heat source data were related (Table 5) resulting in the relationship of three months (September, October, And November) of 5% (only one case in 20 years).

Table 6. Relation of heat waves to the number of heat sources, 90th percentile

SEP		OCT		NOV	
Years	**Nº of Heat Sources**	**Years**	**Nº of Heat Sources**	**Years**	**Nº of Heat Sources**
2005	20499	**2003**	8728	**2011**	2529
2010**	25482**	**2008**	9093	**2003****	2762**
2007	28192	**2007****	11059**	**2010**	3914
2004	30565	**2002**	11757	**2002**	4412

** Years in which heat waves occurred

According to this result, the maximum correlation values between FC with heat waves occurred in September and November of 2010. Year 2010 is considered among the hottest years (IPCC, 2013) with 83,119 heat sources registered, the highest value between 2000 and 2019. In 2007 (September and October) and 2002 (October and November) there is apparently no world record in relation to TM. This could mean that high temperatures in these years could be related to heat sources in eastern Bolivia.

In 20 years of recording the maximum temperatures in Oruro (Table 7), 8 years presented heat waves with 10 heat waves from September to November. Only two heat waves were registered in 2016; the first one lasting 10 days and the second one lasting 6 days. In 2010 and 2014, 6 consecutive days registered heat waves in September with four heat wave events. Last year, 2019, presented only two heat waves in September and October.

Table 7. Days affected by heat waves in Oruro

AÑO	SEP	OCT	NOV
2003			26-27-28-29
2004			1-2-3-4
2006			13-14-15-16
2007		25-26-27-28	
2010	25-26-27-28-29-30		
2014		17-18-19-20-21-22	
2016	9-10-11-12-13-14-15-16-17-18		
2016	25-26-27-28-29-30		
2019	27-28-29-30	26-27-28-29	

Finally, the data above the 90th percentile from September, October, and November of the heat sources in some years are related to heat waves that have been registered in Oruro. Andrade et al. (2017) have identified heat waves in the central highlands, with the 90th and 95th percentile limiting "extremely long periods of consecutive warm days". Unfortunately, they do not specify the number of days.

These mentioned heat waves are related to the phenomenon of El Niño 97-98 and to warm years such as 2010.

Conclusions

Based on the proposed research hypothesis: "the maximum temperatures and the formation of heat waves in the city of Oruro were influenced by forest fires occurred in the eastern region of Bolivia between 2000 and 2019 (20 years)", the final conclusions are:

There is a correlation in the months of April and May with a level of significance of $\alpha = 0.05$ between the monthly maximum temperatures and the monthly heat sources.

Maximum temperature series of Oruro reinforce the hypothesis that there is an absence of a warming trend, at least in its area of influence.

Records of the meteorological station located at Juan Mendoza's airport in the city of Oruro relate some heat waves to very hot years with a greater number of heat sources, such as 2010. On the contrary, the heat sources that occurred in eastern Bolivia from 2002 to 2007 are not statistically related to heat waves in Oruro, with a significance level of 5%.

Acknowledgements

This work was carried out thanks to the Terrestrial Ecosystems Unit of the Institute of Ecology of the Universidad Mayor de San Andrés. Precipitation data were obtained from the SENAMHI data bank and corroborated with data from AASANA-Oruro. The data on heat sources (hot spots) were taken from the INPE-CPETEC page.

Bibliography

Alencar, K.M. & Nóbrega, R.S. (2017). Tendencia pluviométrica y concentración estacional de precipitación en la cuenca hidrográfica del río Moxotó – Pernamcuco – Brasil. *Revista Geográfica de América Central*, 58, enero-junio, 295–313. ISSN 1011-484X.

Andrade, M., Moreno, I., Calle, J.M., Ticona, L., Blacutt, L., Lavado-Casimiro, W., Sabino, E., Huerta, A., Aybar, C., Hunziker, S., Brönnimann, E. (2017). ATLAS Clima

y eventos extremos del Altiplano Central Perú-Bolivia. 1981–2010. *Geographica Bernensia*, 188. DOI: 10.4480/GB2018.N01.

Balde, B., Vega-García, C. (2019). Estimación de emisiones de GEI y sus trayectorias en grandes incendios forestales en Cataluña, España. Universidad de Lleida. Departamento de Ingeniería Agroforestal, España. *Madera bosques*, 25(2). Xalapa.

Ballester, F. (2008). El impacto del calor extremo en la salud: nuevos retos para la epidemiología y la salud pública. Rev. Esp. *Salud Publica*, 82(2). Madrid mar./abr. 2008.

Barrucand, M., Rusticucci, M. & Vargas, W. (2008). Temperature extremes in the south of South America in relation to Atlantic Ocean surface temperature and Southern Hemisphere circulation. *Journal of Geophysical Research Atmospheres* 113(D20):20111. Doi.org/10.1029/2007JD009026.

Castillo, M., Pedernera, P., Peña, E. (2003). Incendios forestales y medio ambiente: una síntesis global. *Revista ambiente y desarrollo de CIPMA*, XIX(3 y 4).

Castro, L.M., & Carvajal, Y. (2010). Análisis de tendencia y homogeneidad de series climatológicas. *Revista EIDENAR*, 9, enero-diciembre. Escuela de Ingeniería de Recursos Naturales y del Ambiente. Universidad del Valle, Cali, Colombia.

Chacón, L.M. (2015). Efecto de los incendios forestales sobre la calidad del aire en dos ciudades colombianas. Tesis Magister en Ingeniería Ambiental, Facultad de Ingeniería, Departamento de Ingeniería Química y Ambiental. Universidad Nacional de Colombia, Bogotá D.C.

Cohen, J.L., Furtado, J.C., Barlow, M., Alexeev, V.A., Cherry, J.E. (2012). Asymmetric seasonal temperature trends. *Geophysical Research Letters*, 39, l04705. Doi:10.1029/2011GL050582, 2012.

Fuentes, H.L., Selaya, G. (2011). Evolución de focos de calor en Bolivia e implicaciones transfronterizas del humo de incendios forestales. *Biodiversidad Amazónica* 3(3), 28–34. Retrieved from: https://revistas.unamad.edu.pe/index.php/Biodiversidad/article/view/71/63.

García de Pedraza, L. (1988). Invasiones frías y olas de calor. *Asociación Meteorológica Española – AME*. Boletín de la AME, 3ª etapa, Nº 11, 23–31.

Garreaud, R.D., Rutllant, J. (2006). Factores meteorológicos de la contaminación atmosférica en Santiago. In: R. Morales Segura (ed.), *Episodios críticos de contaminación atmosférica en Santiago. Colección de Química Ambiental*, Santiago de Chile: Editorial Universitaria, pp. 36–53.

Garrett, K.A., Forbes, G.A., Gómez, L., Gonzáles, M.A., Gray, M., Skelsey, P., Sparks, A.H. (2013). Cambio climático, enfermedades de las plantas e insectos plaga. In: E. Jiménez Zamora (ed.), *Cambio climático y adaptación en el Altiplano boliviano*. CIDES-UMSA, D.L.: 4-1-1151-13. ISBN: 978-99954-1-527-3.

Gobierno Autónomo Municipal de Oruro (2017). Informe municipal de calidad del aire, gestión 2017. Red de monitoreo de la calidad del aire- MoniCA. http://snia.mmaya.gob.bo/web/modulos/PNGCA/.

Grupo Intergubernamental de Expertos sobre el Cambio Climático (2013). Cambio climático 2013. Bases físicas. Resumen para responsables de políticas, Resumen técnico y Preguntas frecuentes.

Heras, J., Martinez, J.J., Herranz, J.M. (1991). Impactos ecológicos de los incendios forestales. *Revista de Estudios Albacetenses*, 29, 105–117.

IPCC, 2013: Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.) (2013). *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

Le Goulven, P. (1988). Homogeneización de los datos pluviométricos. Seminario "Día mundial de la meteorología", Instituto Nacional de meteorología e hidrología INAMHI, Quito, 03 1988.

Lévy, J.P., Varela, J. (2006). *Modelización con estructuras de Covarianzas en ciencias sociales. Temas esenciales, avanzados y aportaciones especiales*. España: Netbibio. ISBN 13: 978-84-9745-136-9.

Miranda, G. (2020). Caracterización del clima de la cordillera de Azanaques, Oruro. In: *Historia Natural de la cordillera de Azanaques*. Museo Nacional de Historia Natural de Bolivia (en revisión).

Miranda, G., Portugal, M., Salazar, N., Contreras, R., Sánchez, D. (2020). Efectos del "Niño costero-2017" en las precipitaciones y temperaturas registradas en Bolivia (in review).

Organización Meteorológica Mundial – OMM (2011). Declaración de la OMM sobre el estado del clima mundial en 2010. Retrieved from: https://www.wmo.int/pages/prog/wcp/wcdmp/ documents/1074_es.pdf

Organización Meteorológica Mundial – OMM (2011). Declaración de la OMM sobre el estado del clima mundial en 2010. https://www.wmo.int/pages/prog/wcp/wcdmp/documents/1074_es.pdf.

Organización Mundial de Meteorología – OMM (2012). Guide to agricultura meteorological practices. WMO-No. 134. http//www.wmo.int/pages/prog/lsp/meteoterm_WMO_en.html.

Organización Mundial de Meteorología – OMO (2020). Reported new record temperature of 38°C north of Arctic Circle. https://public.wmo.int/en/media/news/reported-new-record-temperature-of-38%C2%B0c-north-of-arctic-circle.

Puertas Orozco, O.L., Carvajal Escobar, Y., Quintero, Á. (2011). Estudio de tendencias de la precipitación mensual en la cuenca alta-media del río cauca, Colombia. *Dyna*, 78(169), 112–120. Universidad Nacional de Colombia.

Romero, M. (2016). Pruebas de bondad de ajuste a una distribución normal. *Revista Enfermería del Trabajo*, 6(3), 105-114. ISSN-e 2174-2510.

Rusticucci, M.M., Barrucand, M.G. (2000). Climatología de temperaturas extremas en la argentina consistencia de datos. Relación entre la temperatura media estacional y la ocurrencia de días extremos. https://www.researchgate.net/publication/239609796.

Rusticucci, M.M., Vargas, W. (2002). Cold and warm events over Argentina and their relationship with the ENSO phases: Risk evaluation analysis. *International Journal of Climatology* 22(4):467–483

Salinas, A., Pérez, R., Ávila, L. (2006). Modelos de regresión para variables expresadas como una proporción continua. *Salud Pública de México*, 48(5), 395–404. http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0036-36342006000500006&lng=es&tlng=es (access: 2.07.2020).

Sandoval, B., Reyes, R.T., Oyarzún, G.M. (2019). Mecanismos de los efectos nocivos para la salud de la contaminación atmosférica proveniente de incendios forestales. *Revista Chilena de Enfermedades Respiratorias*, 35(1). http://dx.doi.org/10.4067/S0717-73482019000100049.

Thom, H.C.S. (1966). Some methods of climatological analysis. Geneva: Secretariat of the World Meteorological Organization. WMO Series, No. 199.

Venegas, L.E., Mazzeo, N.A. (2016). La velocidad del viento y la dispersión de contaminantes en la atmósfera. V congreso internacional sobre cambio climático y desarrollo sostenible Universidad Nacional de La Plata, 14 al 16 de septiembre de 2016. http://www.aero.ing.unlp.edu.ar/cliv2/public/actas%20congreso/15.Venegas.CLIV2.pdf.

Vincent, L.A., Peterson, T.C., Barros, V.R., Marino, M.B., Rusticucci, M., Carrasco, G., Ramírez, E., Alves, L.M., Amvrizzi, T., Berlato, M.A., Grimm, A.M., Marengo, J.A.,

Molion, L., Moncunill, D.F., Rebello, E., Anuncisção, Y.M.T., Quintana, J., Santos, J.L., Báez, J., Coronel, G., García, J., Trebejo, I., Bidegain, M., Haylock, M.R., Karoly, D. (2005). Observed Trends in Indices of Daily Temperature Extremes in South America 1960–2000. *Journal of Climate*, 18(23), 5.011–5.023.

Wanderson, L.S., Dereczynski, C., Chang, M., Freitas, M., Machado, B.J., Tristão, L., Ruggeri, J. (2015). Tendências observadas em indicadores de extremos climáticos de temperatura e precipitação no Estado do Paraná. *Revista Brasileira de Meteorología*, 30(2), 181–194.

Yagüe, C., Martija, M., Torres, J., Maldonado, A.I., Zurita, E. (2006). Análisis estadístico de las olas de calor y frío en España. 29ª Jornadas Científicas de la AME. http://hdl.handle.net/20.500.11765/5166, https://repositorio.aemet.es/bitstream/20.500.11765/5166/1/C7-trabajo%20Yague%20et%20al.pdf.

Abstract

Heat sources in the Eastern region of Bolivia between 2000 to 2019

The emissions produced in forest fires are transported through the air to different areas of the emission source causing an increase in the concentrations of different pollutants in cities. On June 20, 2020 in Verjoyansk (Russia, Eastern Siberia) the temperature reached a maximum of 38ºC (100.4°F) as a result of a heat wave caused by increased forest fires. In the same way, Bolivia had forest fires causing various direct and indirect effects in the last years. Forest fires which occurred between 2000 and 2019 in the eastern region of Bolivia could influence the maximum temperatures recorded in Oruro and as a consequence of this relationship heat waves were formed. The hypothesis tested was: "The higher the number of fire sources in the eastern region of Bolivia, the higher the maximum temperature values in Oruro". Maximum temperature series (TM) and heat sources (FC) stored in INPE-Brazil were evaluated with descriptive statistics parameters, assumptions of the linear regression models, and Spearman's correlation. Heat waves were detected with 90th percentile and four consecutive days of TM. In 20 years the TM series goes from 11.8 to 26.6ºC and the FC series goes from 9 to 34.574. Both series do not respond to the assumptions of the linear model, so the Spearman correlation was applied. Based on the proposed research hypothesis it is concluded that there is a correlation between the monthly maximum temperatures and the monthly heat sources in the months of April and May with a level of significance of = 0.05. In this case the daily series of TM show the formation of heat waves.

Keywords: heat waves, maximum temperature, heat sources, forest fires, Oruro

Trade trends in cyberspace before COVID-19. The case of online commerce in Mexico

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Introduction

Geography is defined as the science that studies the interactions between human beings and the environment in which they live (Capel Sáez, 1981). The whole of science and society is undergoing great changes due to the irruption of the Internet in all areas of life. This science is also affected by this fact: the neogeography and the new global geography (Buzai, 2015) imply an analysis of the new communication channels and how these should be studied with the geographer's tools (Capel, 2009).

In this context, geography has evolved into a global geography (Buzai, 2015) and a network (Capel, 2009), which interacts in physical space and online space, since the territory is the base where these changes take place. The transformation of society is unquestionably linked to the transformation of the territory, a dynamic element in constant evolution in a new virtual environment called cyberspace (Barbachán, 2009). Today, one cannot deny the magnanimity of the impact of information and communication technologies on various sectors, specifically on the commercial field, where cyberspace plays a fundamental role in the development and evolution of information.

We are currently experiencing a transcendental phenomenon in the history of the human being that directly impacts the physical and virtual worlds. On March 11, 2020, the World Health Organization (WHO) declared the outbreak of COVID-19 as a global pandemic (Cucinotta, Vanelli, 2020). In response to

it, a number of global precautions have been taken to combat the spread of the virus. One such measure was the closure of educational institutions, shopping malls, businesses, and others.

The COVID-19 pandemic has brought about major changes in the methods used to promote business and has triggered an exponential increase in trade in cyberspace. In the face of this situation, technologies and cyberspace have evolved to provide a practical solution to decision makers in the midst of this emerging phenomenon.

According to Llorente and Cuenca's report (2020), isolation has opened the door to new ways of having fun, communicating, shopping and working. The change in habits is marked by the generalization of trends such as virtual leisure, access to home delivery, buying products online and the use of platforms for teleworking.

During the first three months of 2020, the digital behaviors of users around the world were evident, especially when millions of people had to resort to different devices connected to the Internet to help them deal with their daily lives under a scenario of blockage that we had never experienced before.

World context

We Are Social is an online 2.0 marketing and communication agency whose goal is to help brands interact in social media, to listen, understand and participate in the conversations that take place around them. In April, it launched a special edition of its Digital 2020 report with global statistics for the same year, exploring the unprecedented digital trends during the quarantine and including the impact of COVID-19 on global online commerce, where it points out that 47% of the world's Internet users spend more of their time shopping online. The percentage of Internet users in each age group that spend more time shopping online worldwide during the last few weeks is between 24 and 44.

In general, men (55%) have increased their time spent shopping online the most in the 25–34 age group, while the only age range in which women spend more time shopping online than men is 55–64 (33% women vs. 30% men).

The country that has had the greatest impact on online commerce is China, where 67% of Internet users say they spend more time shopping online. It is followed by Singapore (46%), United States (41%), Brazil (39%) and the United Kingdom (37%). In the case of Spain, the percentage of Internet users who claim to spend more time shopping online is 25%, above France (24%), Philippines (23%) and New Zealand (25%).

Within this momentum that has won the online trade around the world, there are certain categories of products that are the most requested by Internet users.

Table 1. Categories of online commerce benefited and affected by COVID-19, 2020

Categories of online commerce benefited and affected by the COVID-19, 2020			
Benefited category	%	Category affected	%
Online Supermarkets	251%	Tourism	–72%
Technology	78%	Luxury goods	–28%
Media	56%	Jewelry and watches	–7%
Food	33%		
Telecom	29%		
Home Products	29%		
Personal Hygiene	27%		
Fashion	19%		
Entertainment	17%		
Cosmetics and Beauty Products	15%		
Chocolate	12%		
Candy or gifts for yourself	9.9%		
Home and Garden	9.7%		
Sale of alcoholic beverages	9.6%		
Furniture	7.7%		
Gifts for others	5.1%		
Holidays	3.6%		

Source: Author's preparation with data from We Are Social, 2020

The Mexican Association of Online Sales (AMVO) is a non-profit civil organization constituted in 2014. Currently there are more than 340 companies that are part of our association. Our mission is to encourage, support and promote the development and expansion of e-commerce and the digital economy in Mexico.

In Mexico, COVID-19 has widely promoted online sales of products, from food and beverages to exercise machines, household appliances, cleaning products, garden, furniture, video games and more. Between 2009 and 2018 the value of online commerce in Mexico had been increasing steadily, with an annual average of 40.1%, according to the latest data reported by the Mexican Association of Online Sales (AMVO).

Despite the fact that in recent years online commerce has gained more ground among companies and consumers, AMVO data indicates that only three out of every 10 SMEs have developed a digital strategy. In this sense, this document aims to carry out an analysis of online consumer behavior before and during the pandemic in a stage of transition from the physical to the digital, in order to understand the behavior and trends of the online consumer in the face of this emerging phenomenon.

Methodology

This document makes a comparative analysis of trade trends in cyberspace before and during COVID-19 for the case of Mexico, based on studies conducted by the Mexican Association of Online Vendors (AMVO). 1) Study of online sales 2020, 2) Impact of COVID-19 on online sales in Mexico, carried out in January 2020 and in a period from April to October, respectively, with the aim of knowing and understanding the behavior of the online consumer in the face of this emerging phenomenon.

Table 2 shows the general characteristics of the aforementioned studies, from which the data for making the comparisons was obtained.

Table 2. General characteristics of the studies carried out by AMVO

General characteristics of both studies		
Item	**Online Sales Study 2020, January 2020**	**Impact of COVID-19 on online sales in Mexico**
Objective	Before COVID-19	April – October 2020
Method	To know the coexistence of traditional shopping and e-commerce in a Mexican consumer, from purchasing habits, preferences, attitudes towards brands, shopping experience, as well as to understand the perspective of buyers only from the physical channel and the barriers they perceive from the digital channel.	During COVID-19
Study house	The information was collected through the online portal Netquest, which consists of an online community of consumers who share information through surveys and other data collection techniques in exchange for incentives.	To measure the impact that the phenomenon of COVID-19 is having on the perceptions and habits of consumption and purchase of the Mexican consumer in different surveys since April.
Total sample	Netquest	The information was collected through the online portal Netquest, which consists of an online community of consumers who share information through surveys and other data collection techniques in exchange for incentives.
Margin of error	960 surveys	Netquest
Selection Criteria	+/– 3.46% (I.C.95%)	1539 surveys

Representativeness	Mexican Internet users, men and women between 18 and 55 years old, buying any product or service in the last year.	+/- 2.49% (I.C.95%)
Lifting	National level	Mexican Internet users, men and women between 18 and 56 years old, buying any product or service during the pandemic.

Source: Author's elaboration with data from AMVO, 2020

Results

According to AMVO, before the pandemic the price was no longer part of the "Top 5 reasons to buy online". What stood out were the benefits of conviviality and practicality. The chart below shows the top 5 reasons that the online shopper had before the pandemic.

Table 3. Main reasons to buy online before COVID-19

Top reasons to buy online Before COVID-19
1. I receive my purchases at home
2. Saving time
3. I can compare prices and variety before I buy
4. I find products that are not available in a physical store
5. I find products that are not sold in Mexico

Source: Author's elaboration with data from AMVO, 2020

In the study, they show that the most important concerns of physical channel buyers in order to encourage them to shop online before the pandemic were focused on security issues, increased variety of payment methods, and more product information. Therefore, on average, Mexican consumers consulted 5 sources of information before deciding to buy any product or service, which represents 30% more than in 2019.

The sources that stood out most for online shoppers before the pandemic are search engines, websites, branded websites or apps, recommendations from friends and family, and finally social networks.

Previously, a Mexican shopper interacted between the physical and digital channels, either during a previous search or during the purchase. However, the perception of security when buying online was increasing, as 7 out of 10 shoppers felt safe, reflecting a positive experience that encouraged them to continue shopping, and the perception of fraud risk was decreasing considerably.

On the other hand, there was still a latent fear of being a victim of electronic fraud in the minds of consumers who were not yet shopping through digital channels.

Impact of COVID-19 on the Mexican consumer

From the analysis of the surveys, it can be deduced that the pandemic has generated different impacts on the life of the human being, particularly the impact on the Mexican consumer. The study reflects that the anguish for money issues (40%), the uncertainty about not knowing what will happen (40%), family and friends infected (34%), anguish of being able to get infected (32%), decrease in quality of life by not being able to leave (30%), loss of income due to loss of work (22%), insecurity, theft and looting (19%), among others, are the main feelings of the consumer in the face of the pandemic.

However, several consumers are slowly beginning to resume their activities, with 38% leaving because of work, but taking precautionary measures, another 29% are quite isolated and their exits are limited to buying food, medical emergencies and restricting contact with precautionary measures (AMVO, 2020).

This has a direct impact on changes in consumer habits, as they resort to searching the Internet to find out where to buy, out of fear of contagion. Table 4 shows a comparison of the main reasons for buying online before and during the pandemic, where it can be seen that priorities changed considerably: before it was for convenience and in the new normality it is for fear of getting infected.

Table 4. Main reasons to buy online before and during COVID-19

Symbology	
COMFORT	**FEAR**
Main reasons to buy online before and during COVID-19	
Before COVID-19	**During COVID-19**
I receive my purchases at home	I didn't want to leave home because of the COVID-19 pandemic
Saves time	I wanted to avoid crowds in the physical store
I can compare prices and variety before I buy	I needed to receive my purchases at home
I find products that are not available in a physical store	On the Internet I found more promotions and discounts than in a physical store
I find products that do not sell in Mexico	I was able to compare prices and variety before buying

	I found products that were not available in a physical store
	I was able to pay in several ways
	The delivery of my purchases was very quick and easy
	I needed to do my shopping from where I was
	I needed to save time
	I was able to see a detailed description of the products
	I was able to see the reviews of other buyers
	I found products that are not sold in Mexico

Source: Author's elaboration with data from AMVO, 2020

For both studies, an analysis of Mexican male and female Internet users between the ages of 18 and 56 who purchased a product or service before and during the pandemic was conducted. According to AMVO, the Mexican consumer continues to evolve, especially in ages over 35 and regions outside of Mexico City such as the Pacific, North, Central and Southeast (see Figure 1) areas where the increase in consumers in cyberspace is noticeable.

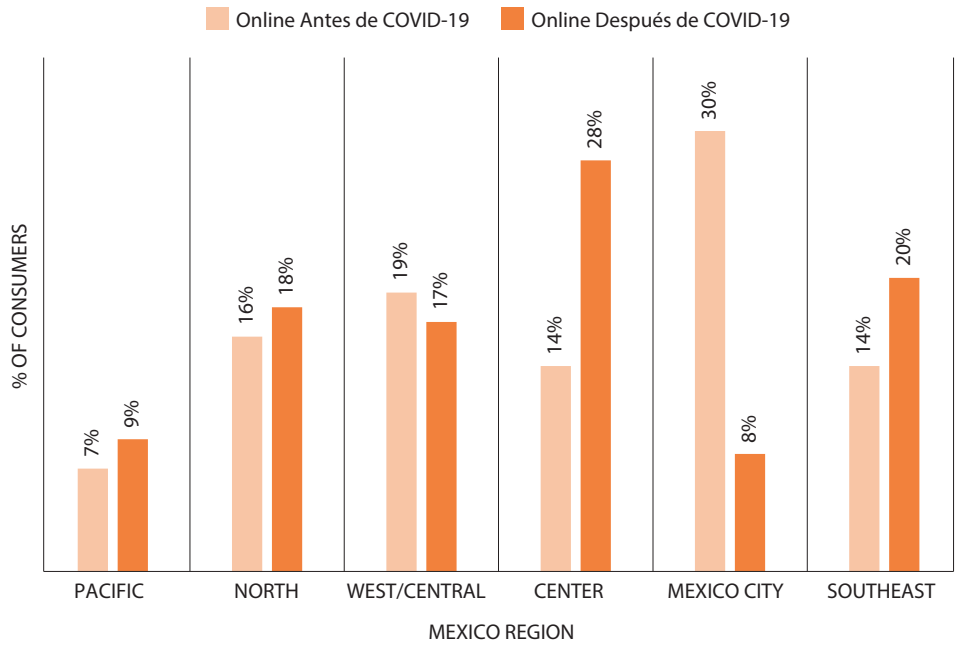


Figure 1. % of online consumers by geographic region

Source: Author's elaboration with data from AMVO, 2020

Table 5 and Figure 2 show products purchased online before and during the pandemic, where we can see that the top 5 products purchased before the pandemic were: food at home (62%), electronics (56%), fashion (55%), consoles and video games (49%) and beauty and personal care (47%). On the other hand, the 5 products acquired mainly during the pandemic are: medicines (42%, 20%, 28%), food, basic foods (60%, 29%, 31%), technology (18%, 41%, 44%), media and entertainment (16%, 24%, 20%) and health and wellness (12%, 12%, 9%). The data reflect that while prior to the pandemic consumer priorities were shallow, they have since shifted to health and basic needs, as time in quarantine is spent on entertainment, and there is a significant increase in the purchase of technology-related products.

Table 5. Products purchased online before and during the pandemic

Temporary	Before COVID-19	During COVID-19		
Product/Service	Enero	Abril	Junio	Octubre
Meals at home	**62%**	NF	NF	NF
Electronic	**56%**	NF	NF	NF
Fashion	**55%**	8%	29%	26%
Consoles and video games	**49%**	NF	NF	NF
Beauty and personal care	**47%**	NF	NF	NF
Sports	46%	5%	11%	9%
Tools	42%	NF	NF	NF
Home appliances	41%	NF	NF	NF
Furniture and Home Decor	37%	4%	14%	13%
Children's	33%	NF	NF	NF
Pets	27%	10%	9%	8%
Automotive	25%	NF	NF	NF
Supermarket	20%	NF	NF	NF
Medications	19%	**42%**	**20%**	**28%**
Food (basic foods)	NF	**60%**	**29%**	**31%**
Technology	NF	**18%**	**41%**	**44%**
Media and entertainment	NF	**16%**	**24%**	**20%**
Health and wellness (physical, spiritual, psychological)	NF	**12%**	**12%**	**9%**
Beverages (alcoholic and non-alcoholic)	NF	9%	10%	7%
Children and babies	NF	8%	13%	11%

Source: own preparation with data from AMVO, 2020

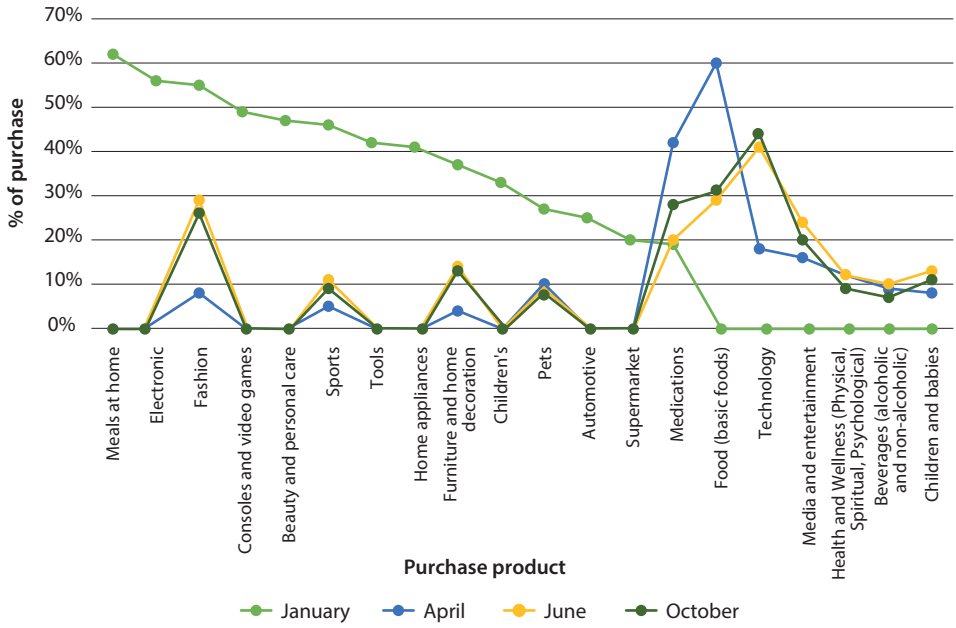


Figure 2. % of products purchased online before and during COVID-19

Source: Author's elaboration with data from AMVO, 2020

With respect to product shipments, consumers previously ordered products from home (79%) and from their office or work (31%). However, since the outbreak of pandemic shipments to home increased by 10% and shipments to office decreased by 21% (see Table 6). This reflects a significant number of consumers working from home (Figure 3).

Table 6. Shipping location before and during the pandemic

Shipping location	January	October	CONDITION
Shipping to my home	79%	89%	INCREASED
Delivery to my office/work	31%	10%	DISCONTINUED
Pick up at a distribution center	10%	9%	DISCONTINUED
Sending to a friend/relative's home	9%	5%	DISCONTINUED
Pick up in store	6%	4%	DISCONTINUED

Source: Author's elaboration with data from AMVO, 2020

The comparative analysis of both studies suggests that consumers' perception of security when shopping online before and during COVID-19 is evolving for the better, as they have a good online experience. At the beginning of the

pandemic they had the perception that buying online was not safe at all, later their confidence in the network increased (see Figure 4). However, the study indicates that 6 out of 10 buyers have had problems with their purchases, the main problem being longer delivery times.

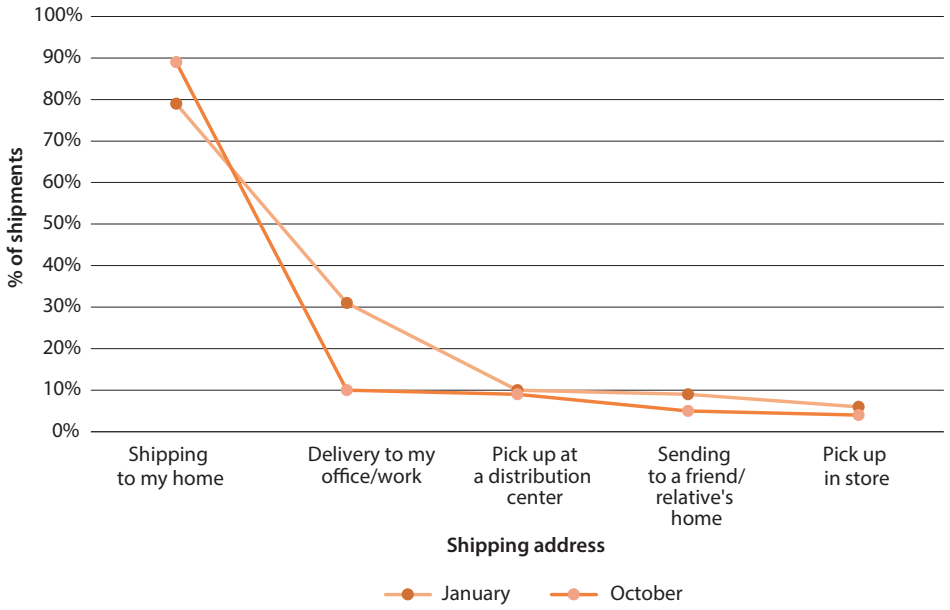


Figure 3. Shipping location before and during the pandemic

Source: Author's elaboration with data from AMVO, 2020

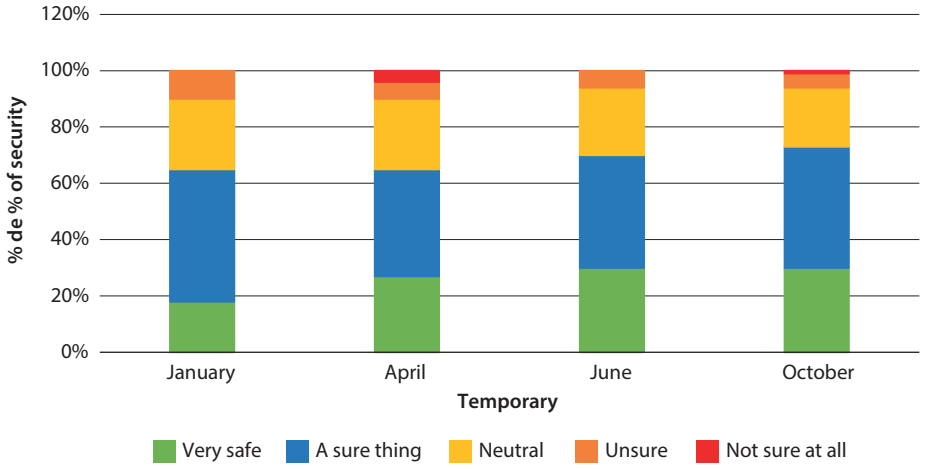


Figure 4. Perception of safety when shopping online before and during the pandemic

Source: Author's elaboration with data from AMVO, 2020

Mexico and the world

The impact of COVID-19 is significant in various sectors of trade in Mexico and the world. The following graph shows a comparative analysis of the behavior of the different sectors in the face of COVID-19, where it can be seen that at the beginning of the pandemic (April) supermarkets had an increase of more than 200% in their online sales in the world (in Mexico it was not very representative), the online purchase of medicines and basic foods occupies the second place in the increase of sales for both cases. The technology, entertainment, health and wellness, alcoholic beverages, fashion and home furniture sectors also increased their sales but to a lesser extent. According to the data found, tourism (–72%), luxury goods (–28%) and jewelry and watches (–7%) reported a drop in their online sales worldwide; for the case of Mexico this data is not available.

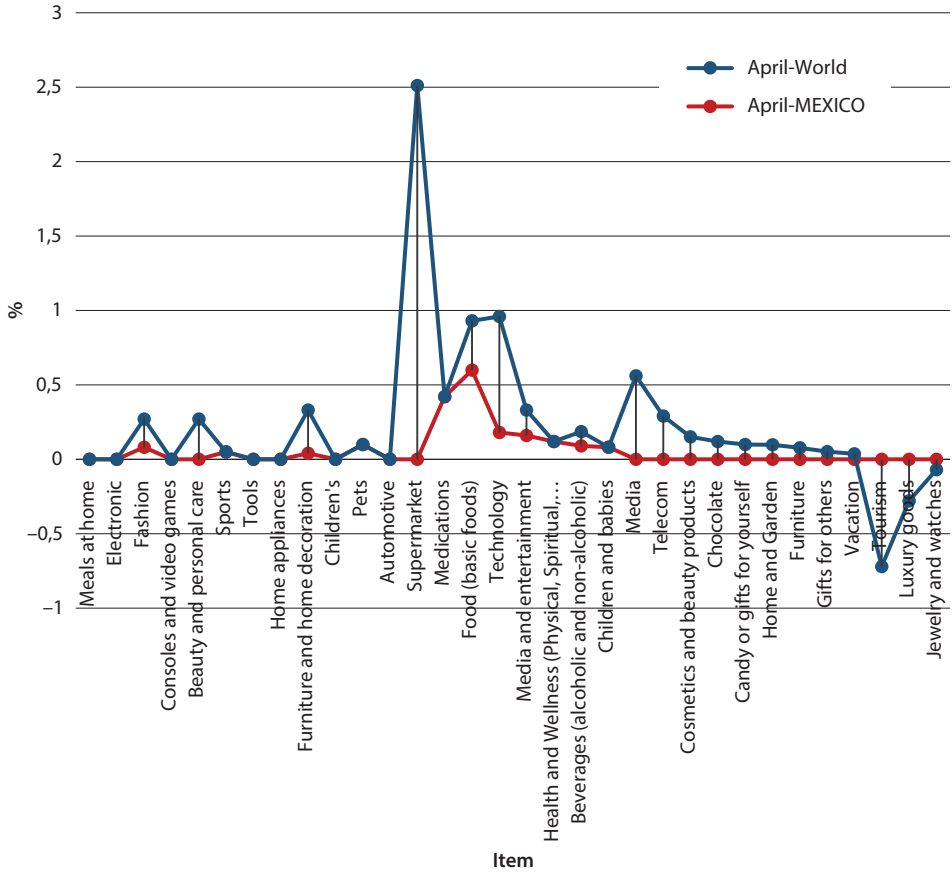


Figure 5. Comparison between Mexico and the world of commerce during the pandemic

Source: Prepared by the authors with data from We Are Social and AMVO, 2020

Discussion and conclusions

The impact of COVID-19 on Mexico and the world with respect to online commerce is undeniable. The population has been increasingly immersed in the world of cyberspace, as traditional commerce was limited by the pandemic. Online commerce is gaining ground among Mexican consumers in a trend that seems irreversible in today's world. The online consumer sectors suffered a drastic change in the face of this emerging phenomenon, with food and health being the categories most requested by consumers, since they are the ones that cover their basic needs.

Previously, online consumers' choices were based on convenience, receiving their purchases at home and saving time. Today, they are based on fear, since they do not want to leave their homes to avoid contagion. There is a growing response and confidence of the online consumer in different geographical regions.

As time goes by during the pandemic, consumer needs vary from basic necessities products or services to technology and entertainment products or services, suggesting a need for consumer distraction. It should be noted that a large percentage of the population currently continues to conduct their activities from home, which can cause stress and uncertainty and therefore their online purchases can be a welcome distraction.

In general, an analysis of commercial trends in cyberspace in the face of this emerging phenomenon is of great importance because knowing and understanding consumer behavior in this new reality provides knowledge that shows us a dynamic scenario. It starts from the feelings of consumers, showing us where trade is going at the pace of the pandemic, which reflects the sectors benefited and affected in this process. This fact shows how COVID-19 influences, determines or conditions trade trends in cyberspace.

Bibliography

Asociación Mexicana de Ventas Online (AMVO) (2020). Estudio de Venta Online 2020, versión pública. https://www.amvo.org.mx/wp-content/uploads/2020/01/AMVO_EstudioVentaOnline2020_Versi%C3%B3nP%C3%BAblica-1.pdf.

Asociación Mexicana de Ventas Online (AMVO) (2020). Impacto COVID-19 en venta Online México 5.0, Análisis 5 de noviembre, versión pública. https://www.amvo.org.mx/wpcontent/uploads/2020/11/AMVO_Estudio5.0_ImpactoCOVID19_P%C3%BAblica.pdf.

Barbachán, I.I. (2009). Visión Geográfica del ciberespacio. Aracne. Recuperado a partir de: http://revistes.ub.edu/index.php/aracne/article/view/1154/1130.

Buzai, G.D. (2015). Evolución del pensamiento geográfico hacia la Geografía Global y la Neogeografía. In: M. Fuenzalida, G.D. Buzai, A. Moreno Jiménez, A. García de León Loza, *Geografía, geotecnología y análisis espacial: tendencias, métodos y aplicaciones*. Santiago de Chile: Triángulo, pp. 4–16.

Capel, H. (2009). La historia, la ciudad y el futuro. *Scripta Nova*, XIII(307).

Capel Sáez, H. (1981). *Filosofía y ciencia en la geografía contemporánea*. Barcelona: Editorial Barcanova.
Cucinotta, D., & Vanelli, M. (2020). WHO Declares COVID-19 a Pandemic. *Acta Biomed*, 91(1), 157–160. Doi:10.23750/abm.v91i1.9397.
Kemp, S. (2020). Digital 2020: Panorama digital global. 30 de enero 2020. In: We Are Social. https://datareportal.com/reports/digital-2020-global-digital-overview.
Llorente y Cuenca (2020). Informe Tencencias Consumer 2020, Ideas LLYC, explorar, inspirar. llorenteycuenca.com.

Abstract

Trade trends in cyberspace before COVID-19. The case of online commerce in Mexico

The present work aims to make a comparative analysis of trade trends in cyberspace before and during COVID-19 for the case of Mexico, based on studies conducted by the Mexican Association of Online Vending (AMVO). 1) Study of online sales 2020, 2) Impact of COVID-19 on online sales in Mexico, carried out in January 2020 and in a period from April to October, respectively, with the aim of knowing the behavior of the online consumer in the face of this emerging phenomenon.

Keywords: trade trends, commerce, online sales, online shopping, geography of trade

COVID-19 in Mexico. Space-time behavior from the socio-spatial constraints, February–October, 2020

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1. Theoretical framework

Hippocrates of Cos (460 BC), in his work "On the waters, the airs and the places", set up the characteristics that the geographical situations of Asia and Europe could exert on any disease. John Snow, father of epidemiology, drew up a map, in which the dots were the cholera cases during the London epidemic of 1854 and the crosses represented the wells of water from which the sick people drank. Snow suggested closing the wells where the cholera cases were registered and with this goal it was possible to abate the cholera epidemics in Europe. When adding these variables, he used the superposition of maps (what today is called map algebra), a great step for the development of Geographic Information Systems in spatial analysis: adding, subtracting, multiplying and dividing maps. With this, various methods of spatial analysis were generated, such as the Local Moran Index, LISA index, multi-criteria analysis, areas of influence, among others.

The World Health Organization (WHO) in 1945, conceptualized health as "the state of complete physical, mental and social well-being and not only the absence of disease". This concept opens the doors to the social dimension

and includes aspects related to the population, not only at the individual level, addressing issues such as: health and well-being, social vulnerability to diseases, susceptibility to communicable diseases, physical activity, healthy eating, air quality, climate change, health coverage, dengue, diabetes, violence, inequalities and inequities in health, topics that are on the health agenda of the Sustainable Development Goals (SDG).

In 2005 the WHO, formed the Commission of Social Determinants of Health (SDH), focused on the study of social and environmental factors that affect health. The social determinants of health are the circumstances in which people are born, grow, live, work and age, and the health systems to combat the diseases they suffer, at the global, national and local levels.

Lalonde (1974) proposed the following as determining factors: biological (which are related to the individual); the environment (which have to do with the local, state, national, and world context); lifestyles (individual, family); health services (presented at various geographic scales: national, state, and local). These determinants pass through various scales of analysis, from the individual to that of the population, from the local to the global, which affect, to a greater or lesser extent, the health levels of the population and therefore constitute the origin of health problems, in which strategies and policies have to be focused mainly on the stages of prevention and health promotion, which have lower costs than the curative stage.

Dever, in the study of mortality in North America, estimated that the health system contributes to 11% of the decrease of mortality; the intervention in the environment would decrease it by 19% and the improvement of lifestyles would decrease it by 43% (Dever, 1984). In this sense, in each geographic context, the role of each determinant and/or conditioner of health will vary, according to social, economic, cultural, and political characteristics, among others, both under normal and extraordinary conditions, such as the case of the COVID-19 pandemic, where the availability of health services, lifestyles, decision-making strategies, as well as the environment play a fundamental role.

A theoretical contribution proposed by Buzai and Santana (2018) is related to the Socio-spatial Conditioning factors of Health (SCH): Bases and conceptual scope. The theoretical support of determinism is analyzed and it is highlighted that possibilism arises as an alternative in the search for solutions. It moderates the deterministic perspective and leads it towards a partial determinism located between determinism and indeterminism, closer to the first one than to the second one, and incorporates the spatial dimension with which it broadens the territorial context of health, being able to theoretically encompass all potential contextual conditioning factors.

Beyond biology, all contextual conditioning will be socio-spatial in a specific time, as conditions influence the health situation, but do not determine it. There is always a margin of uncertainty that arises from the individual characteristics and responses of man, in the face of health problems (Buzai, Santana, 2018).

2. COVID-19 in Mexico

The pandemic spread through all the states of Mexico in 27 days. On March 31st, there were a total of 1,215 confirmed cases, 121 new cases, and 29 deaths (Table 1).

Table 1. Mexico: COVID-19, cases and accumulated deaths

Month	Total cases	Total deaths
February	4	0
March	1215	29
April	19224	1859
May	90664	9930
June	226089	27769
July	424637	46688
August	599560	64414
September	743216	77646
October	924962	91753

Source: Government of Mexico. Ministry of Health (2020)

According to the government of Mexico, the first phase of the pandemic ran from February 28th to March 23rd, 2020. The main influencing factors were international and national mobility, through flights from Europe and the United States to Mexico. The epicenters of the Main Metropolitan Areas were the Valley of Mexico (MAVM), Monterrey (MAM) and Guadalajara (MAG).

The second phase ran from March 24th to April 20th, 2020 and the spread of the pandemic touched tourist and border cities in the North, as well as the states of Tabasco, Sinaloa and Baja California. On April 20th, 2020, 8772 cases and 712 deaths were registered.

The third phase lasted from April 21st to May 31st, 2020. On this last date, 90,664 cases and 9,930 deaths were registered. The highest values of confirmed cases, up to May 31st, occurred in Mexico City, the State of Mexico, Puebla, Baja California, Sinaloa, Tabasco and Veracruz, as well as border, coastal and inland cities. The highest values of deaths were registered in Mexico City (2,658), State of Mexico (1,159), Baja California (865), Tabasco (520), Veracruz (518) and Sinaloa (501).

The stage of the new normal began on June 1st. It was characterized by the implementation of the three-colored epidemiological risk measurer for the opening of certain economic activities, according to 10 criteria, such as infections, deaths, new cases and hospital availability, among others. The month with the highest values in the number of cases and accumulated deaths was July, in which summer begins, as well as October, in which autumn begins, with a rebound in the number of infections.

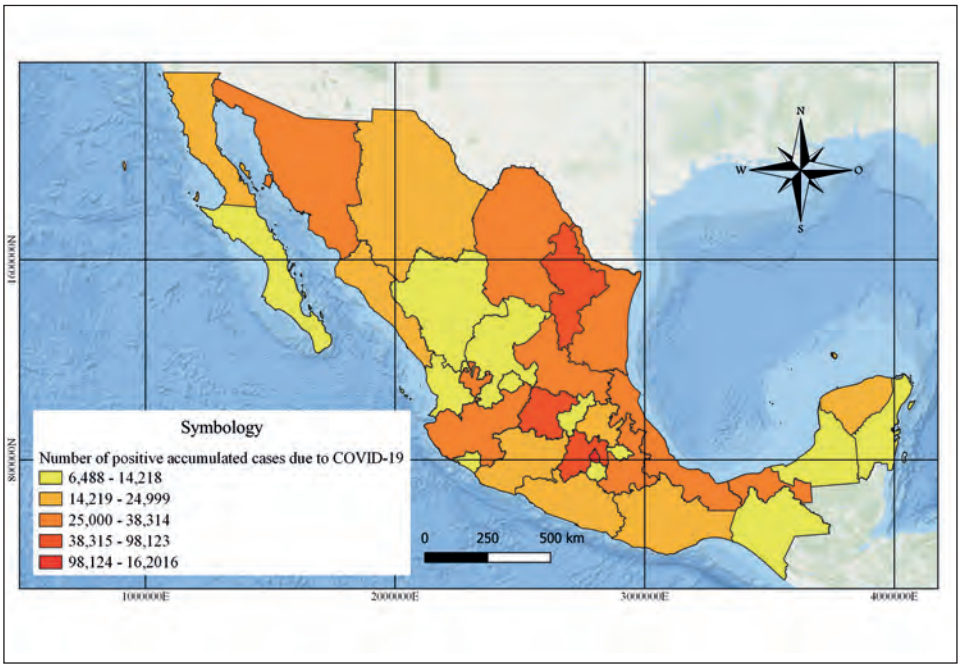


Figure 1. Mexico: number of positive accumulated cases due to COVID-19, up to October, 2020

Source: Government of Mexico. Ministry of Health (2020)

On July 31st, 2020, 424,637 total cases and 46,688 total deaths were registered, with significant increases, almost doubling those reported in June. The highest values of contagions were recorded in Mexico City, with 73,454, as well as in the State of Mexico with 52,700, Tabasco with 21,301, Veracruz with 20,852, Guanajuato with 20,770 and Puebla with 20,026 infections. Regarding deaths, the highest values were reported in Mexico City with 8,920, the State of Mexico with 6,379, Veracruz with 2,755, Baja California with 2,604, Puebla with 2,443 and Sinaloa with 2,191 deaths. During the months of August and September, the trends reported constant slight increases.

The month of October was characterized by being a month of changes and contrasts, with a trend of slight but constant increase in deaths and a more significant trend in infections. However, there are significant increases in the number of new cases. On October 5th, 28,115 new cases were registered.

Variations were recorded throughout the month. The least one was recorded on October 11th with 3,175 new cases in the last 24 hours.

On October 31st, there were 924,962 accumulated cases and 6151 new cases in one day, registering 91,753 deceases, with a monthly average of 85,472, with 33% of general hospital beds and 27% of beds occupied with a ventilator.

In the period from February to October 2020, the trends in deaths and cases were different: from February to June, the trends in deaths and

Table 2. Mexico. COVID-19. Cases and deaths positively accumulated per state, up to October 31st, 2020

Entity	Total positive cases	Total positive deaths
Aguascalientes	9,560	851
Baja California	23,114	3,838
Baja California Sur	12,614	608
Campeche	6,488	862
Coahuila	34,171	2,428
Colima	6,554	744
Chiapas	7,541	1,069
Chihuahua	18,425	1,993
Mexico City	162,016	15,173
Durango	14,218	803
Guanajuato	48,997	3,450
Guerrero	22,163	2,174
Hidalgo	15,797	2,286
Jalisco	34,396	4,069
State of Mexico	98,123	10,704
Michoacán	24,999	1,997
Morelos	6,923	1,191
Nayarit	6,721	867
Nuevo León	53,495	3,898
Oaxaca	21,331	1,645
Puebla	35,726	4,777
Querétaro	13,911	1,221
Quintana Roo	13,491	1,829
San Luis Potosí	28,742	2,079
Sinaloa	21,890	3,607
Sonora	38,314	3,170
Tabasco	34,517	3,039
Tamaulipas	32,343	2,674
Tlaxcala	8,478	1,146
Veracruz	37,105	4,838
Yucatán	21,616	1,789
Zacatecas	11,183	954
Total national	924,962	91,773

Source: Government of Mexico. Ministry of Health (2020)

cases have been on the constant increase, slightly in the case of deaths and more significant in contagions. In July, the highest values of cases and deaths were reported and on October 5th there was a rebound in total cases, with 789,780.

Regarding the cases and deaths registered in the last 24 hours, from July to October 9th, the decline began, registering the lowest value of deaths in the last 24 hours. The lowest values of confirmed cases in the last 24 hours were recorded during the month of September. On October 19th, 2020, there was a rebound in daily values, the constant rise in deaths and cases began again in the middle of October, 2020, with the start of the acceleration of the pandemic at the end of this month.

On October 31st, 2020, the states with a very high range of cases accumulated by COVID-19 were: Mexico City (162,016), State of Mexico (98,123), Nuevo León (53,495), and Guanajuato (48,997). The main Metropolitan Areas are located in the states already mentioned, according to population size (Table 2 and Figure 1).

In relation to the number of accumulated positive deaths, the states with a very high rank were: Mexico City (15,173), State of Mexico (10,704), Veracruz (4,838), Puebla (4,777), Jalisco (4,063), Nuevo León (3,898), Baja California (3,838), and Sinaloa (3,607) (Table 2).

3. Some socio-spatial conditions

Throughout the expansion of COVID-19 in Mexico, the spread of the pandemic is not homogeneous to the territory, since it presents a geographical variability, according to the socio-spatial conditions of each context, both at national and state levels. Some conditioning factors have changed, while others have remained.

One of the geographical conditions is related to the location of Mexico. In the northern hemisphere, by October 31st, it is the autumn season, which can worsen the health situation in the population, due to the fact that cases of COVID-19 will be joined by cases of respiratory diseases (influenza, bronchitis, pneumonia, among others) (De la redacción, 2020).

Some geographical and environmental conditioning factors are tropical storms, cold fronts, hurricanes and floods, which coastal states face annually. Due to COVID-19 pandemic, the health situation worsened when the population was evacuated, as it was the case with the tropical storm "Cristóbal", which, during the month of July caused flooding in the states of Campeche, Quintana Roo, and Yucatán; the storm "Hanna" in the state of Tamaulipas (Le Duc, Sánchez, 2020). In turn, at the beginning of October, cyclones, tropical storm Gamma and hurricanes Delta and Zeta occurred, causing flooding in the same states. There were also floods that affected the Southeast region of Mexico, in the states of Chiapas, Tabasco and Veracruz (López, 2020).

Another conditioning factor is air pollution in large cities and/or Metropolitan Areas, which, in normal situations, affects the health of the population. In conditions of the pandemic, respiratory problems worsened.

In the epidemiological and health conditions we can find the sanitary measures. At the beginning of the pandemic, Hugo López Gatell, head of the Undersecretariat of Prevention and Health Promotion, in the Ministry of Health of Mexico, pointed out that the pandemic in Mexico would be long, and that the population should respect health measures, such as: quarantine (strict and partial), the official programs "Stay home" and "Keep a healthy distance" (one and a half meters of physical distance among people), basic hygiene measures such as the use of mouth covers, gloves and masks, as well as personal hygiene and hygiene at home, in order to reinforce prevention measures so as not to get infected.

Until October 2020, there was no cure for COVID-19 and laboratories such as Pfizer-BioNTech, AstraZéneca, CanSino, Sputnik V and Moderna, among others, were developing the vaccine against COVID-19, in record time, which means a meaningful breakthrough for humanity. In previous epidemics and pandemics, it took decades for a vaccine to be ready, and now, practically a year after the pandemic started, the vaccine is already available, thanks to scientific and technological advances, as well as investments and strategies of the Government of Mexico, among other factors.

Worldwide, the application of the vaccine began in December 2020. By December 25th, 3.3 million doses were applied in the United States and China (one million respectively), United Kingdom (800 thousand), Israel (209 thousand), Russia (200 thousand), Bahrain (51 thousand), Canada (44 thousand), Chile (4 thousand), and Mexico (3 thousand) (Our world in data, 2020).

On December 24th, 2020, the first supply of the vaccine came to Mexico from Belgium, from the Pfizer-BioNTech Laboratory. 3,000 doses were applied, in Mexico City, in the State of Mexico and in Querétaro.

On December 25th, the next supply arrived with 42,900 doses, out of which 34,125 were destined for Mexico City and 8,775 for the States of Coahuila and Monterrey. These first supplies of the vaccine came from Belgium, from the Pfizer-BioNTech Laboratory.

The determinant of comorbidities constitutes a vulnerability to face COVID-19, because they affect the increase in deaths from COVID-19 and have their origin in unhealthy lifestyles, characterized by high consumption of sugar, flours, fats, salt and processed products.

By March 31st, 2020, deaths confirmed by COVID-19, due to comorbidity, were 29, and were distributed as follows: 55.17% with hypertension, 48.28% with obesity, 41.30% with diabetes, 20.69 %, with chronic obstructive pulmonary disease (COPD), 17.24% with chronic renal failure, 6.90% with smoking, 6.90% with immunosuppression, and 3.35% with cardiovascular diseases (Federal Government, Ministry of Health. Press conference. Daily report COVID-19). By October 31st, arterial hypertension represented

18.86%, obesity 17.34%, diabetes 14.90%, and smoking 7.28% (Geosalud México, 2020).

The percentages of comorbidities have varied throughout the pandemic, since they have registered a significant decrease at the beginning of the pandemic and have decreased in May. With regard to demographic determinants, the distribution and density of the population have been influencing the concentration of COVID-19 cases. The area of Mexico is 1,956,874 km^2, according to its own projections based on INEGI and CONAPO. By 2020, Mexico has had 127,191,826 inhabitants and a density of 65 inhabitants per km^2.

The distribution of the population in Mexico, by states, those with the largest population by 2020 and vulnerable to the expansion of the COVID-19 pandemic, is: State of Mexico with 17,338,220 inhabitants and a density of 780 inhabitants/km^2 and Mexico City with 9,025,363 inhabitants and a density of 6,073 inhabitants/km^2 (both are bordering). In the center of the country and throughout the pandemic, these two places have registered the highest values. The states of Veracruz and Jalisco with 8,514,724 inhabitants and 119 inhabitants/km^2 and 8,368,602 inhabitants and 107 inhabitants/km^2, respectively; the states of Puebla (close to Mexico City) with 6,573,843 and 192 inhabitants/km^2 and Guanajuato, located in the central west, with 6,202,449 inhabitants and 204 inhabitants/km^2 correspondingly, as well as the state of Nuevo León with 5,571,904 inhabitants and 87.57 inhabitants/km^2.

These states are home to the Main Metropolitan Areas of Mexico, according to population size, such as the Metropolitan Area (MA) of the Valley of Mexico (MAVM), with 21,942,666 inhabitants; the MA of Guadalajara (5,243,178 inhabitants), the MA of Monterrey (5,133,917); the MA of Puebla and Tlaxcala (3,179,162), and the MA of Toluca (2,377,828), which together with other cities and Metropolitan Areas, as well as tourist and border cities (from the North), constitute the main epicenters of the COVID-19 pandemic, for which they are considered as vulnerable due to the high concentration and density of population.

With regard to social conditions, the mobility of the population is essential. During the longest period of the pandemic, the majority of the population respected health measures. However, in September, for various reasons, agglomerations began and it had an impact on the increase in infections and deaths, such as on September 15th, the day on which the Independence of Mexico is celebrated; some religious celebrations such as the day of "San Judas Tadeo" (October 29th), clandestine parties, weekends on the beaches of Acapulco, Zihuatanejo, Puerto Vallarta, and Cancun. In the same way, there have been gatherings of soccer fans, in which many people respected sanitary measures, but others did not.

With regard to poverty in Mexico, according to the National Council for the Evaluation of Social Development Policy (CONEVAL), by the year 2018, the highest percentages of the population in poverty were registered in the states of Chiapas (76.4%), Guerrero (66.5%), Oaxaca (66.4%), Veracruz (61.8%)

and Puebla (58.9%), among others, which is a situation that places them as vulnerable to the COVID-19 pandemic. The economic conditions constitute fundamental aspects in the growth and development of the countries.

The COVID-19 pandemic has impacted unemployment worldwide, both in large corporations and in small industries and/or businesses. As a result of the pandemic, almost a million jobs were lost. According to the Mexican Institute of Social Security (IMSS), in January and February 2020, the number of jobs began to increase, but the period in which losses were recorded was from March to July; the recovery started in August with 92,390 places; in September, with 113,850 and in October, which was the month in which more jobs have been recovered, with 211,703 (Federal Government, October 30th, 2020).

According to INEGI, Mexico shows a 12% growth and recovery of the economy, in the third quarter (July, August and September), which is complemented by the recovery of jobs. Some of the aspects that have had a favorable impact on domestic consumption are the social programs of the Government of Mexico, such as the provision of pensions to the elderly, financial support to personnel with a disability, scholarships for students, support for personnel working in the program "Sembrando vidas", as well as financial credits to small industry and remittances, which even in the conditions of the pandemic in the United States are still meaningful (Martínez, 2020).

With regard to economic activities by sectors, the primary ones continue to develop, a favorable and fundamental condition due to the food supply to the population; the impact of the pandemic on industrial activities depends on the industrial branch. While the car industry has been hit hard, the electronics industry has been posting positive balances. The tertiary sector, which includes goods, services and commerce, also depends on the branches. In relation to education, this is performed with online sessions. However, in the basic levels (mainly at elementary level) there are problems, particularly in rural areas where the internet is not available. Many other commercial branches continue through home office or online sales, thus opening up new opportunities in certain economic branches. In the commercial sphere, products such as medicines, food and clothing, among others are being delivered home (Avila, 2020).

During confinement, many of the economic activities are fortunately carried out at home, like home-office, online sessions, internet sales and home delivery of products or medicines.

4. Conclusions and recommendations

The expansion of the COVID-19 pandemic has occurred in a differentiated way in the territory, according to the geographical, environmental, epidemiological, social and economic conditions, among others. It is the same pandemic; however, territorial contexts do not have the same conditions to face it.

In the case of Mexico, Mexico City and the State of Mexico have registered the highest values of cases and deaths throughout the pandemic, which have to do with the distribution, density, and mobility of the population. It is followed by states that are home to the main Metropolitan Areas, border cities, coastal cities and some of the interior ones that are still the epicenters of the expansion of the pandemic.

Geographic and environmental factors such as hurricanes, floods and air pollution have also had a greater or lesser effect on the increase of cases and deaths from the COVID-19 pandemic. Epidemiological factors, such as comorbidities keep on playing an important role in deaths from this disease.

In the socio-spatial conditions, people's responses to the pandemic are diverse. Some people respect the health measures, but others ignore them. Some people do not believe in the pandemic, so they continue to create agglomerations, which influences the spatial-temporal behavior of the COVID-19 pandemic.

Each person's decision-making is important: what each person does or does not do has influence. The recurring message has been: if it is possible for you, stay at home, and if it is not possible, then protect yourself and strictly attend to sanitary measures, so that we all contribute to cutting chains of infections.

The COVID-19 pandemic leaves us with many lessons and presents us with new challenges, new scenarios that are possible, for example, potentiating geo-technologies, in the economic sector, home office or semi-face-to-face work, and internet sales. Socially, it has made us improve family relationships, semi-face-to-face and virtual education; politically, it has contributed to strengthening prevention and healthy lifestyles promotion programs, instead of keeping on investing large amounts of money in the curative stage, which is expensive for the government and the family, mainly due to medical treatments for chronic degenerative diseases. It is mandatory to make our Metropolitan Areas and cities healthier, more sustainable and more resilient, because with the COVID-19 pandemic, urban spaces have been the most affected ones. It is imperative to support the development and achievement of Sustainable Development Goals.

Bibliography

Avila, A. (2020). Crecen 300% ventas de juguetes por internet, tras el semáforo rojo. *Newspaper Milenio*, 28 de diciembre, 2020, p. 22.

Buzai, G.D. & Santana, M. (2018). Condicionantes Socioespaciales de la Salud (CSS): Bases y alcance conceptual. *Anuario de la división Geografía*, 12, 157–171. Recuperado de: http://www.adgunlu.wixsite.com/anuario-geografia.

CONAPO – Consejo Nacional de Población (2018). Delimitación de las zonas metropolitanas de México, 2015. Retrieved from: https://www.gob.mx/conapo/documentos/delimitacion-de-las-zonas-metropolitanas-de-mexico-2015.

CONEVAL – Consejo Nacional de Evaluación de la Política de Desarrollo Social (2020). Informes de pobreza y evaluación de las entidades federativas 2020. Retrieved from: https://www.coneval.org.mx/coordinacion/entidades/Paginas/Informes_Pobreza_Evaluacion_2020.aspx.

De la Redacción (2020). Recomiendan reanudar viajes al extranjero en 2021. Newspaper La Jornada, 06 de julio de 2020, p. 3.

Dever, A. (1984). Epidemiology in health services management [https://books.google.com.mx/books Consultado 20 de diciembre de 2018].

Gatrell, A. (2002). *Geographies of Health*. Malden, Massachussets: Blackwell Publishers.

Geosalud México (2020). https://geosalud.github.io/Geosalud/.

Gobierno de México. CONACYT y Centro Geo. https://datos.covid-19.conacyt.mx/#DOView.

Government of Mexico. Ministry of Health. Daily Technical Releases. https://www.gob.mx/salud/acciones-y-programas/coronavirus-covid-19-comunicados-tecnicos-diarios-historicos-2020.

Government of Mexico. Ministry of Health (2020). Open data. General Direction of Epidemiology [online]. https://www.gob.mx/cms/uploads/attachment/file/589815/Comunicado_Tecnico_Diario_COVID-19_2020.10.31.pdf.

Instituto Nacional de Estadística y Geografía – INEGI (2010). Censo de población y Vivienda. México.

Instituto Nacional de Estadística y Geografía – INEGI (2015). Encuesta Intercensal. México.

Lalonde, M. (1974). A new perspective on the health of canadians: 28 years later. *Revista Panamericana de Salud Pública*, 12(3).

Le Duc, J. y Sánchez, M. (2020). Emergencia por desbordamiento. Desmontan un hospital Covid-19 para migrantes en Matamoros. Newspaper La Jornada, 31 de julio de 2020, p. 26.

López, R. (2020). Intensas lluvias azotan de nuevo a Tabasco. Newspaper La Jornada, 31 de octubre de 2020, p. 26.

Martínez, F. (2020). Se Congratula AMLO de haber equilibrado la crisis sanitaria con la económica. Newspaper La Jornada, 31 de octubre, 2020. p. 5.

OMS (2020). Coronavirus disease (COVID-2019) situation reports. Recuperado de: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports.

OMS (2020). Panel de la OMS sobre la enfermedad por coronavirus (COVID-19). https://covid19.who.int/.

Organización Panamericana de la Salud (OPS). https://www.paho.org/es/documentos-tecnicos-ops-enfermedad-por-coronavirus-covid-19#comorbilidades.

Our world in data, https://ourworldindata.org/covid-vaccinations?country=MEX. Fecha de recuperación: 26 de diciembre, 2020.

Santana, M. (2020). COVID-19 en México: Comportamiento espacio temporal y condicionantes socioespaciales, febrero y marzo de 2020. *Revista Posición*, 3. Dossier: Análisis geográfico del COVID-19. ISSN 2683-8915 [online]. Retrieved from: https://posicionrevista.wixsite.com/inigeo/numero-3-2020 Abril, 2020.

Santana, M., Santana, G., Sánchez, C., Sánchez, R. y Ortega, R. (2020). COVID-19 en México: asociación espacial de cara a la fase tres. *Revista HYGEIA*, ISSN: 1980–1726. Revista Brasileira de Geografia Médica e da Saúde. http://www.seer.ufu.br/index.php/hygeia/issue/view/1972.

Wikipedia (2020). Temporada de huracanes en el Atlántico de 2020. Retrieved from: https://es.wikipedia.org/wiki/Temporada_de_huracanes_en_el_Atl%C3%A1ntico_de_2020 (access: 29.12.2020).

Abstract

COVID-19 in Mexico. Space-time behavior from the socio-spatial constraints, February-October, 2020

The purpose of this work is to show the spatio-temporal behavior of the COVID-19 pandemic in Mexico, with an approach from the socio-spatial conditioning factors, from February 28th to October 31st, 2020. The socio-spatial conditioning factors considered are geographic, demographic, epidemiological, social, and cultural. The methods and techniques used are statistical, graphical and cartographic. The sources of information are official data from the Federal Government, international organizations, consultation of the *Geosalud* webpage in Mexico, as well as a hemerographic review. The results indicate that, eight months after the pandemic, there is a heterogeneous spatial-temporal behavior, affecting the population in a different way, according to the socio-spatial conditioning factors of each territorial context and the stages of the pandemic.

The trends in the number of cases and deaths show different behaviors: a significant constant rise in infections and a slight rise in deaths. Considering the trend of new daily cases, the highest values were recorded in July, which subsequently declined. Significant ascents began in mid-October, a situation that can be affected by not taking health measures into account and both the autumn season and the coming of winter.

Keywords: COVID-19, spatio-temporal behavior, socio-spatial conditioning factors

Facing sanitarian crisis: between sustainability and compatibility

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Introduction: the civilizational transition

The framework could be defined as a civilizational transition, where the traits of the ancient order are present, simultaneously with several changes in the way of life, social production and minds; those changes imply a challenge centered on the question of people's life or death, as individuals and community. The concept of community embraces the ecosystems at different levels, but overall includes our Mother-Earth who is threatened by human civilization. From here it is evident that the problem behind is not only the capitalist economy, but also our relation with nature and of course our mind fixed in the egocentric paradigm based in anthropocentrism. This has resulted in considering our planet as a mere man's property who in turn, sees himself as master of all the species (Genesis, Kant, Hegel, Marx, etc.). Nevertheless, at the same time man falls into an abysm of illusion and fictitious relationships. From here, sustainable paradigm makes evident its limitations to combat the pandemic. So it is necessary to review the sanitarian crisis together with the economic one, knowing that such concept has been quickly passed over by the course of pandemic.

The starting point, as Hobbes pointed out (Gambra, 1973), is the description of our society as a war among others; while in a deeper vision it lays in the coexistence of man and nature. The result of it is the dependence of man on nature, which means that man can't give sustainability to nature who is in permanent change. This is the opposite to the extreme behavior that manifests itself in the necessity of correcting nature by man (geo engineering). Therefore, it is possible to sustain only in a short time.

With the coronavirus pandemic, the world lives in a strong global environmental crisis, now in its epidemiologic phase, and particularly in the context of climate change and its different eco-social impacts. The eventual transition to a new economic and political model all around the world (regardless of their ideologies), must have as center the health (planetary, social and personal) and not the economic benefits, if human race is to survive in these new conditions (Fetscher, 1985).

This transition is ambivalent; since, on the one hand, it advances toward new forms of technological slavery, but, on the other hand, it constructs a new socio environmental order, founded in the principles of cooperation and reciprocity with earth and humans, but not with its submission as it now happens with the fictions of sustainability. This virus may not defeat capitalism but it could be the end of neoliberalism (Byung-Chul, in Agamben et al., 2020), accelerating social conflicts.

In a few words, the pandemic provokes a dual effect: more exploitation but at the same time the fighting for real liberty, including the awakening of the people.

In order to fight against virus, it is necessary to exercise several types of cooperation (especially at international level), from a social division of work between patients and physicians, on the one hand, and the society as a whole (within digital revolution), on the other.

In that way, it can be said that internal cohesion has two forms: the positive one (combat the virus through more socioecological actions and the practice of collective responsibilities) and the negative (degree of human agglomeration existing in different spaces).

For this reason, the virus has been called by Žižek (Agamben et al., 2020, p. 24a; Bergoglio, 2016) a "neoliberal virus" or "ideological virus" because it reinforces individualism. Nevertheless, it also develops communality (Díaz, 2005), especially of a family and local groups; and also through a major eco-social responsibility.

This historical situation is a threat and consequence of predator model, characterized as an extractive one (of ecosystem and the human and earth bodies); it is a system which takes more and more from nature and man, and returns fewer nutrients and energy to them. The question is if sustainability means to sustain the latter.

In this mode of appropriation of nature, the incompatibility society-nature in addition to the incompatibility between social production and private appropriation (Engels, 1968, p. 268), are translated in the energetic and socioeconomic imbalances, beyond any stable balance, among persons, communities and ecosystems. Then sustainability is different if we speak about compatibility (positive form) or incompatibility (negative form).

With the pandemic more diseases derivate from over consumption, such as overweight, obesity, hypertension, heart and kidney insufficiencies, liver diseases, etc., as well as addictions.

The paradox of the process we live, is the return to the domestic life (like self-consumption), which is in contradiction to the theories of modernization, based in commodification. This is an enormous achievement because while the local is the basis for the global, the family is the basis for the local.

The transitional process toward a new civilization has a double character: on the one hand, it results in the intensification of the international system and its contradictions; on the other, we can observe the opening of the new routes of *conviviality* between humanity and nature (Illich, 1980).

A new and mysterious disease

To understand the pandemic of coronavirus, we are going to include three epistemic approaches. The first one is connected with the fracture and conflict of the metabolism between man and nature (Marx, 1966). This one is manifested, as Lovelock (2007) named, in the planetary diseases. At the bottom of this question is the war with nature, in practice and theory, especially with neoliberalism and the concomitant predation like cognitive and economic expression of such a broken metabolism (Foster, 2004).

This war with nature has two moments: 1. A war against nature (Torres, 2006), through many human actions which have resulted in an irreversible damage to ecosystems and the earth as a whole, like intense pollution of soil, water, plants and man, extinction of species, agricultural monocultures, and so on. 2. A war or revenge (Engels, 1961; Lovelock, 2007) of nature against humans with the climate change and "natural" disasters, which have become more harmful for society and mankind.

Why are we talking about a war? Because it means two characteristics: more degradation and even destruction of ecosystems and natural resources.

A third moment is the need to recognize our inability to win this war. Mainly because man depends on nature and he is not the its owner. The consequence of the previous is the need to recognize our inability to win such a war mianly becasuse human depends on nature and he is not his owner.

For that reason, the only thing we can do in front of this situation is to declare peace with earth (and among nations). Humanity as a whole should establish a moratorium on predation in the world; otherwise the outcome would mean more devastation and human suffering.

The second considered metabolism is the social metabolism (Marx, 1985), which for its part is expressed in the social diseases like world poverty, inequity and marginality; it refers to the permanent changes in the metamorphosis of capital.

The third metabolism considered here is the biological metabolism of the individuals, with chronical or transmitted diseases (like infections).

The causes for these problems in public health are related to the feeding system in the world, the ingestion of several kinds of poisons, including drugs (medicines) offered by the so called *Big Pharma*. But, actually, they were more deaths of other diseases than those of coronavirus.

The world requires the overcoming of the causes and consequences of the three above mentioned metabolisms and the physical and social imbalances associated with them. From the beginning, it includes commitments toward stopping the world and local wars (Bergoglio, 2016), the transfer of capital from destructive production to a productive reproduction and the limitation of over consumption linked to that (Georgescu-Roegen, 1975). This would permit to reach diminishing deterioration (Latouche, 2005). But we can also add the respect for human rights, and specifically the recognition of rights

of nature (Ferry, 1994). This means a change in the mentality and in public policies at a global and local levels.

One more outstanding issue is that conditions of poverty of the population are associated with low immunity of people because of malnutrition, and the ingestion of toxic substances (based on corporative agribusiness practices). But still more important is the logic of a capitalist system to save money at the cost of diseases and deaths of the working class and their families.

There is a need for capitalism which is based in the concentration of workers and means of production. This is explained by the necessity to increase the rate of profit.

For this reason, capitalism has created and expanded the virus by the process of urbanization, more transportation and communication means and, of course, through the logic of the globalization process (in economic, political, cultural and military senses).

Environmental origin of coronavirus and overcoming the catastrophe

This is connected with the transfer of the virus from animals to humans (Shiva, 2020; Foster, 2020). But this data is merely a product of the hazard because such a virus could have appeared in any part of the world. The place where the virus developed is not important, but the social and ecological conditions which brought globalization, urbanization and exploitation of man and nature are.

The main challenge is the need to adapt (not sustain the status quo) the human beings to a new drastic changes in the behavior of GAIA (natural cycles). This is the main answer which we must give to stop the above mentioned war.

Many people have died, but many more will do. But thanks to new technologies the collective deaths and diseases (from COVID-19 or related to the virus) were not too high.

From the other point of view, fewer people and less production-consumption diminish pressure over the atmosphere and around the world. Otherwise, the hecatomb would bring much more devastation.

Nature (soil, water, animals, plants) was infested by man and as a consequence, man is infested by nature (different kind of pests).

Destruction and reconstruction of the community

Both trends are present: more capitalism at a new stage, ciberfascism, and on the other hand, the emergence of cooperation and solidarity; nothing is written yet. However, this means that health must be considered as center of economy, the earth, ecosystem, communities and people; in a few words, elevation of the immunological system.

In this sense, the economic reanimation should be implanted into social changes (not permanently) and into all the orders, because the coronavirus

have questioned (Klein, 2015) the way of life of humanity; submitted to the dictation of the *homo economicus*, anchored on modes of thought that in these new conditions are already anachronistic.

The main need is the reform of capitalism social appropriation, social control over hyper consumption, clean energies and restructuration of society.

The route is to follow the eco-eco cycles: beginning from conservation and restoration of ecosystems, increasing green areas, food sufficiency and energy efficiency.

In fact, we have to survive together with pandemic of coronavirus and the others to come, because the social and ecological conditions will be surely the same while more aggravated because of the failures in public policies, especially around the Agreement of Paris (2015) and the Agenda 2030 (ONU, 2018). These documents have already become obsolete, resulting in anachronisms, considering the new context of the pandemic crisis and the need to articulate many changes mainly in connection with a reform of capitalism, combining emotional and cognitive transformations of everybody, everywhere.

This is a good opportunity to take advantage of the societal shock that COVID-19 brought and to run into a new great transformation (Polanyi, 1975), which includes drastic changes in the domestic, public and productive spheres.

The differences between developed and developing countries lie in the major technical and educational capacity and forms of communication. Actually overconsumption and irrationality of high developed countries is stronger than the sanitarian measures, and for this reason those countries are not able to avoid contagions. These differences are present in the practice of sustainable development in both group of countries.

In addition, in other societies (Ponting, 2007) pandemics were located in asynchronous situation, but not all over the world and at the same time.

From sustainability to compatibility

The risks for humanity in this modern pandemic are high and the fragility and vulnerability of men and society facing this threat and its impacts are enormous.

Can the human race survive? (Fetscher, 1985). If the answer is positive, what will be the level of damages to society and the results translated in human lives and their economic systems? The only tool we have is the sustainable development, but it was practically shattered with little progress.

But the pandemic has questioned (Klein, 2015) not only agenda (ONU, 2018) and objectives (ONU, 2017) of sustainable development, but the sustainable development concept too. This leads to a redefinition of the concept based on a positive or a negative sustainability. The first one means compatibility between humans and nature, the second incompatibility.

Beyond sustainability is the need to connect human and natural cycles to overcome double crisis. It is not about continuing with the same human

behavior, it is not a question of sustaining anything, but adapting man's behavior to nature's cycles.

Indeed, from here emerges the need to reform capitalism, through the empowerment of the people, to address sustainable development in a positive way, which at last means reaching, step by step, compatibility inside society and in relation with nature. So far, it has been impossible in our world's organization. That is the route to stop pandemic, through a new civilizational process and with a compatible development.

Conclusions

1. Even if it is a natural phenomenon, this pandemic is finally human (concentration of capital and population).

2. Struggle or cooperation with the virus is the dilemma; while capitalism tamed nature, at last it is tamed by it.

3. Globalization at the local level strengthens a positive globalization. It is a new form to articulate the global with local and regional.

4. The latter requires in turn the fight against the anti-values (Dyson, 1985) as the ecological devastation and destruction of community.

5. Facing the failures of sustainable development and its institutional approach, new strategic lines include: new economy, centrality of health, environmental education, feeding, green areas, water…

6. We require an ontic change at individual and social level, as much as an epistemic new vision of the world and nature, where economy is not above health. This is a precondition to build a real new civilization (Okada, 1995; Chomsky, 2020; Shiva, 2020).

7. The technological revolution accentuated by pandemic must be controlled by society.

8. Emergency of social and solidarity sector; in opposition to the disabilities and insufficiencies of private and state sectors.

9. Stop the predation model together with the conservation of ecosystems. This is a great lesson of pandemic, demonstrating that crisis can be used to change society and civilization.

10. The need to boost eco-social restructuring, especially facing climate change and a long pandemic of COVID-19. This means a change of the functioning of profit, considered from an end to a mean (compatible development). And vaccines are not enough without changes in the civilizational process.

Bibliography

Agamben, G., Žižek, S., Nancy, J.L., Berardi, F. "Bifo", López Petit, S., Butler, J., Badiou, A., Harvey D., Byung-Chul, H., Zibechi, R., Galindo, M., Gabriel, M., Yañez González, G., Manrique, P., Preciado, P.B. (2020). Sopa de Wuhan. Buenos Aires: ASPO.

Bergoglio, J. (2016). *Laudato si.* Encíclica del santo padre Francisco sobre el cuidado de la casa común. https://www.oas.org/es/sg/casacomun/docs/papa-francesco-enciclica-laudato-si-sp.pdf.
Chomsky, N. (2020). Superaremos la crisis del coronavirus, pero tenemos crisis serias por delante. https//:www.culturainquieta.com/es/pensamiento/item/16693 (access: 20.04.2020).
Díaz, F. (2005). Comunidad y comunalidad. En: *Antología sobre autores populares e indígenas*. México, Dirección General de Culturas Populares e Indígenas, SEP.
Dyson, F. (1985). *La carne, el mundo y el demonio*. México: Planeta.
Engels, F. (1961). *Dialéctica dela naturaleza*. México: Grijalbo.
Engels, F. (1968). *Antidhuring*. México: Grijalbo.
Ferry, L. (1994). *El nuevo orden ecológico*. Barcelona: Tusquets.
Fetscher, I. (1985). *Condiciones de supervivencia de la humanidad*. México: Alfa.
Foster, J.B. (2004). *La ecología de Marx*. Barcelona: Topo Rojo.
Foster, J.B. (2020). En: *Economía moral*, La Jornada, México, 15 de abril de 2020.
Gambra, R. (1973). *Historia sencilla de la filosofía*. Madrid: RIALP.
Georgescu-Roegen, N. (1975). Energía y mitos económicos, *Trimestre –Económico*, XIII(4), núm. 168, México: FCE, 779-834.
Illich, I. (1989). *La Convivencialidad*. México: FCE.
Klein, N. (2015). *Esto lo camba todo. El capitalismo contra el clima*. México: Paidós.
Latouche, S. (2005). *La apuesta por el decrecimiento*. Barcelona: Icaria.
Lovelock, J. (2007). *La venganza de la tierra*. Madrid: Planeta.
Marx, C. (1966). *Manuscritos económico-filosóficos*. México: Grijalbo.
Marx, C. (1985). *El capital (en 8 volúmenes)*. México: Siglo XXI.
Okada, M. (1995). *Principios de agricultura natural*. México: Moa de México.
ONU (2017). Objetivos del desarrollo sostenible. https://www.un.org/sustainabledevelopment/es/objetivos-de-desarrollo-sostenible/.
ONU (2018). Agenda 20-30. https://www.onu.org.mx/agenda-2030/.
Polanyi, K. (1975). *La gran transformación*. México: Juan Pablos.
Ponting, C. (2007). *The green history of the world*. London: Penguin.
Shiva, V. (2020). La agricultura industrial contribuyó en aparición del covid-19. *La Jornada*, 29 de agosto de 2020.
Torres, G. (2006). *Poscivilización; guerra y ruralidad*. México: Plaza y Valdes/UACh.

Abstract

Facing sanitarian crisis: between sustainability and compatibility

This paper discusses the theoretical derivations from the foundations of the sustainability paradigm, taking into account its epistemic difficulties and the few practical advances in the world, in a situation where the speed of devastation is rapid, so there is a need to devise a new strategy which will stop environmental predator model, contributing to the battle against climate change and the extreme poverty. The concept should be updated with better practices, through the principle of compatibility and initiating new alternatives forms of life, facing incongruity and ineffectiveness of the known institutional definition.

Keywords: sustainability, unsustainability, compatibility, incompatibility, pandemic

Water management: environmental and social impacts of dam construction

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Introduction

The complexity of water resources management is concentrated in multiple water uses and extends to other environmental resources such as vegetation, topography and climate (Soares et al., 2011).

The environmental and social challenges of economic growth culminated in September 2015 in the definition of the 2030 Agenda with 17 sustainable development goals. Among them, Goal 6 consists of ensuring the availability and sustainable management of water and sanitation for all through eight targets (Agenda, 2030; 2019; ANA, 2019). However, the importance of water permeates the other goals; for example, goal 3 aimed at promoting health and well-being or goal 15, which deals with terrestrial life protection.

Brazil is known for the abundance of water resources; however, due to its continental dimension, water distribution is quite uneven. Various Brazilian watersheds suffer several threats from anthropic action. In a region with a high urban population concentration, relevant industrial and agricultural production, as in São Paulo state, there is a growing concern with water resources management due to the ever-increasing demand. The construction of dams is an essential mechanism for water supply, especially in times of water vulnerability.

It is worth noting that although the benefits of building dams are numerous, since the planning phase they also have severe social and environmental impacts, especially for the population that resides in their surroundings.

In Brazil, water is considered a public good of economic interest, and its use for human supply is a priority, as determined by Water Law No. 9,433/1997.

Environmental licensing is an administrative procedure that aims to prevent or limit an enterprise's environmental damage, guided by prevention and precaution principles. In Brazil, constitutional laws and amendments impact the process of withdrawing an environmental license, under pressure from different interest groups. Fearnside (2016, 2017) states that legislative proposals and a constitutional amendment that are advancing rapidly in the National Congress nullify environmental licensing.

This research shows how the failures in the environmental licensing process of two flows regulating dams amplify the social, economic, and environmental impacts.

The dams which are the object of this study are Pedreira and Duas Pontes, located in the Jaguari and Camanducaia rivers, respectively. They are in the Southeast region of Brazil, in São Paulo state, in an area characterized by intense population growth and accelerated industrialization process that have overloaded the watershed's water availability.

They are flow-regulating dams. When in operation, they will increase the water supply by 9 m^3/s, from the current 8.2 m^3/s. The Pedreira dam will be responsible for 40% of this increase and Duas Pontes for the remaining 60% (RIMA, 2013, p. 7). Subsequently, the possibility of being used to produce hydroelectric energy, in addition to public supply, is foreseen (SVDS, 2015, p. 24).

Environmental and social impacts in dam construction

With the accelerated demand for water in intense growth regions, it may be necessary to resort to dam's construction. However, this decision can generate several environmental and social impacts.

Among the environmental impacts, Fearnside (2019) highlights that the flooding of the area, as needed by the construction of dams, causes disturbance of forests and the alteration of aquatic habitats with the consequent destruction of aquatic ecosystems.

On the one hand, the construction of dams can generate jobs, improve regional development, irrigate new lands guaranteeing food, and enable control of the flow of rivers that can reduce the economic and human losses caused by floods (Aledo et al., 2015). However, according to CMR (2000), dams can cause many impacts on communities' livelihoods and health that depend on riverside environments.

The decision to build a dam is often made because the negative impacts on the environment and livelihoods based on local populations' natural resources are considered acceptable costs (Beck et al., 2012).

Beck, Claassen, and Hundt (2012) explain that in addition to habitat degradation, dams block the downstream flow of sediments and nutrients, preventing the migration of fish and other aquatic organisms. Besides, by changing the

water temperature and dissolved oxygen, dams can impact aquatic organisms, and reservoirs can contribute to atmospheric greenhouse gases by decomposing biomass and flooded soils.

It is necessary to consider that rivers, watersheds, and ecosystems are essential parts of life and often represent the livelihood of local communities. Thus, as CMR (2000) points out, by understanding, protecting, and restoring ecosystems in the watersheds, it is possible to promote equitable human development and all species' well-being.

Kirchherr, Pohlner, and Charles (2016), when conducting a systematic review with 217 articles on the social impacts caused by dam construction, observed that most are related to electricity, irrigation, water, land, housing, income, and employment. However, the authors concluded that few studies address the social impacts caused during the planning and design of the dams.

In addition, Fung et al. (2019), in a study on small dams, concluded that community participation in the monitoring and application of rules is relevant to having a more equitable water sharing process.

Pedreira and Duas Pontes dams: an overview

Investigations on water flow-regulation related to the local rivers have been developed since the 1970s, because of the growing water demand, especially in the Metropolitan Regions of São Paulo and Campinas.

In a 1993 study, the Department of Water and Electricity (DAEE) of the State of São Paulo presented the first plan for building dams on the Camanducaia and Jaguari rivers (CETESB, 2016). The planned works did not take place, but some of them emerged in subsequent studies.

In the 1990s, the Paulínia Refinery (REPLAN), Petrobras[1] largest oil refinery, commissioned a study to identify possible sources to increase the water flow granted to the company, given the refinery modernization project (SVDS, 2015). In this study, 12 alternative locations were considered, which dropped to 7 when considering the capacity to regularize the water flow, environmental impact, expropriation costs, and the need for road relocation (SVDS, 2015). The choice of the two dams, as "the best axes upstream of the capture of REPLAN" (CETESB, 2016, p. 6), was justified based on water quality and water availability.

In 2012, DAEE was responsible for constructing the two dams that, according to the Environmental Impact Report (RIMA), should be implemented at the same time (RIMA, 2013, p. 18).

[1] Petrobras is a state-owned mixed economy company that operates in the exploration, refining, and marketing of oil, natural gas, and oil products.

Benefits of the construction of the Pedreira and Duas Pontes dams

According to the official environmental impact report on the Pedreira and Duas Pontes dams, the main objective of the barriers is "to increase water security in the PCJ[2] Watersheds region, especially in the municipalities located in the surroundings and downstream of the dams" (RIMA, 2013, p. 4). Therefore, among the benefits of constructing these reservoirs, there is the "safer water supply to the population, especially in periods of prolonged drought, guaranteeing the supply for an estimated population of more than 2.5 million of people" (RIMA, 2013, p. 4). This is probably why the 2016 technical report of the Environmental Company of the State of São Paulo (CETESB), which oversees the environmental license, when dealing with the environmental licensing process of the Pedreira and Duas Pontes dams, recognizes the contribution of the reservoirs in the face of potential shortages of water in the coming years. From this perspective, in the technical study, the emphasis is on increasing water flow that affects the local municipalities.

The 2019 Environmental Programs Progress Report on the Pedreira dam, based on the preliminary environmental assessment carried out by the DAEE, seeks to respond to the influence of the environment surrounding the construction of this dam, given the water deficit and the critical aspect of springs, a fact previously warned by RIMA (2013) due to the demographic increase.

A propositional planning tool for water management in the PCJ Watersheds and its programs, goals, actions, and priorities of intervention involving the Pedreira and Duas Pontes dams is the Water Resources Plan for the PCJ Watersheds 2020-2035. In its thematic section entitled *Guarantee of water supply and drainage*, the action of "monitoring and support to feasibility studies, engineering projects and environmental licensing of Pedreira and Duas Pontes dams (...)" is foreseen (COBRAPE, 2020, p. 119). This target has a medium priority with an estimated start in 2024 and end in 2035. This document lists some benefits to the population with the construction of the Pedreira and Duas Pontes dams. In this sense, it addresses "the benefit of regularizing water flows" (COBRAPE, 2020, p. 82).

The construction of the reservoirs causes changes in the flow regime of the rivers, according to the PCJ Watershed Plan (COBRAPE, 2020, p. 83). The Demands, Returns, and Losses scenario for the water balance in 2025 of the Duas Pontes Dam includes consumption reduction measures such as "(a) loss control in the municipal supply system; and (b) reuse of water from sewage systems".

Studies on dam planning usually estimate society's benefit and recognize its impacts on rivers and local populations (Fearnside, 2019). In the case under study, the PCJ Watershed Plan (COBRAPE, 2020) points to challenges with

[2] The Piracicaba-Capivari-Jundiaí watershed (Bacias PCJ) located in the southeastern state of São Paulo.

polluting loads from agricultural sources in the local rural areas. Regarding the Duas Pontes dam, domestic and industrial effluents and diffuse loads of rural origin are foreseen.

Problems in the construction of the two dams

Dam construction projects require planning, operation, and maintenance. Besides, special attention is needed to water quality in reservoirs for public supply (Bueno, Alcântara, 2020). The same authors clarify "the need for territorial policies that protect the ecosystems and the habitat of the human population, through comprehensive plans and actions proposed and implemented in the local space, that demand social cultures of planning and application of scientific knowledge in public policies" (Bueno, Alcântara, 2020, p. 210).

For constructing the two dams, a removal of 82 families has been planned, alongside the flooding of 10 sites recognized as historical heritage. What is more, one of them is located less than 3 km from an urban center, with the potential for severe damage in the event of a dam rupture.

In the environmental licensing process, the regulatory agencies have satisfactorily evaluated the foreseen compensation actions (CETESB, 2016). In terms of safety, these dams were classified as having high potential damage (SVDS, 2015). According to the current legislation, before the operation begins, a dam safety plan must be prepared.

These two dams' primary purpose is water flow regulation, but electricity generation is a further envisioned use. However, in no official document there is a study of the impacts of this additional use (SVDS, 2015).

In the studies for environmental licensing, the simultaneous implementation of the two dams is foreseen (Consórcio Profill-Rhama, 2020). The construction of the Pedreira reservoir, which obtained the environmental license in 2018, is in progress, but there was an embargo on the other reservoir.

The two dams are on rivers belonging to the Brazil Union. According to Law 9984/2009, the National Water Agency (ANA) is the competent authority for granting the right to use the Union's rivers and monitoring the safety of multiple-use dams in those rivers.

CETESB, the licensing body, in the technical report for the granting of the Environmental License emphasizes the need to present the authorization to use water issued by ANA (CETESB, 2016, p. 39). In the Duas Pontes dam, the DAEE petitioned the authorization to ANA three times, in 2016, 2018, and 2019, but the request was always rejected due to the water quality considered unsuitable for public use because of its high phosphorus concentration (Brasil, 2020).

In June 2020, DAEE published Ordinance 3280/2020 where there is provision for authorization exemption when the works are executed or contracted by DAEE. Based on this Ordinance, CETESB granted a prior license. However,

at the end of September 2020, the Duas Pontes dam's construction was suspended due to an injunction granted in a public civil action.

Meanwhile, in 2019 to provide further legitimacy to the Pedreira dam's implementation, an environmental report was published as part of the Public Health Control Program. The document recognizes the need to "prevent, mitigate and eliminate the negative health impacts of the population residing in the municipality directly affected by the enterprise and of the workers in the enterprise during its construction" (DAEE, 2019, p. 6).

The embargo threatens such double dams' primary purpose: the planned water supply increase, since the embargoed reservoir is responsible for the large part of such increment. The two dams' simultaneous construction was thought of from the beginning and was often highlighted in the RIMA.

The analysis of the events, from the identification of sites to the suspension of one of the constructions, can be interpreted as a concrete example of the weakening of the environmental licensing process and, therefore, of the environmental and social protection process related to the construction of dams.

According to Fearnside (2019), there are several trends to soften environmental licensing, including the decentralization of licensing and transferring more and more authority at the state level. Ordinance 3280/2020 of the DAEE is an example of this, being questioned in the Public Civil Action.

Another trend is "the acceleration of the approval process, often regardless of the completeness of the information or the proponent complying with the requirements that may have been made by the environmental agency" (Fearnside, 2019, p. 108). Again, this happened in the case under study with the Ordinance 3280/2020 of DAEE that allowed to overcome the ANA recusal and to obtain CETESB Preliminary Licensing to start the works in August 2020.

Conclusions

Environmental licensing is an instrument of the National Environmental Policy and a process of environmental protection.

Due to its nature, the construction of dams has significant economic, environmental and social impacts. The cost-benefit analysis that led to the choice of location defined the technical characteristics of the project and justified the joint operation of the two reservoirs. The analysis was also guided by the need to ensure regular supply to meet the water demand of more than 2.5 million people.

The research discussed an example of how the licensing procedure failed. The location choice was kept unchanged, and no concrete action has been taken in these years to improve the water quality of the Camanducaia River. Its excessive quantity of phosphorus was noted since the dam's environmental impact study in 2013. The problem persists, as attested by the three ANA

refusals to grant the concession, the last in 2019. The decision to change the state regulation by expanding ANA's authorization and enforcing environmental licensing was challenged in court. Regardless of the final decision, this study showed that environmental licensing is an obstacle to be overcome, instead of being considered an instrument for protecting environmental resources and promoting sustainable development.

Bibliography

Agenda (2030). Os 17 Objetivos de Desenvolvimento Sustentável. Retrieved from: http:// www.agenda2030.org.br/ods/6/.

Aledo, A., García-Andreu, H., Pinese, J. (2015). Using causal maps to support ex-post assessment of social impacts of dams. *Environmental Impact Assessment Review*, 55, 84–97.

ANA – Agência Nacional de Águas (2019). ODS 6 no Brasil: visão da ANA sobre os indicadores. Brasília – DF. Retrieved from: https://www.ana.gov.br/acesso-a-informacao/institucional/publicacoes/ods6/ods6.pdf.

Beck, M.W., Claassen, A.H., Hundt, P. (2012). Environmental and livelihood impacts of dams: common lessons across development gradients that challenge sustainability. *International Journal of River Basin Management*, 10(1), 73–92. Doi.org/10.1080/15715124.2012.656133.

Brasil (1997). Ministério do Meio Ambiente dos Recursos Hídricos e da Amazônia Legal. Lei nº 9.433. Política Nacional de Recursos Hídricos. Brasília: Secretaria de Recursos Hídricos.

Brasil (2020). Justiça Federal da 3ª Região. Ação Civil Pública Cível nº 5001620-03.2020.4.03.6123. Requerentes: Ministério Público Federal, Ministério Público do Estado de São Paulo. Requeridos: Departamento de Águas e Energia Elétrica, Companhia Ambiental do Estado de São Paulo. Relator: Juiz Gilberto Mendes Sobrinho. Processo Judicial Eletrônico. Bragança Paulista, 28 set. 2020. Retrieved from: https://pje1g.trf3.jus.br/pje/Processo/ConsultaDocumento/listView.seam?x=20092822135714100000035560602.

Bueno, L.M.M., Alcântara, B.R.R. (2020). Os riscos socioambientais da falta de gestão contínua e integrada em reservatórios e suas barragens. In: G.B. Pasquotto, S.M. Benini, E.L. Gulinelli (orgs.). *Temas emergentes do planejamento urbano*. 1 ed. Tupã: ANAP, pp. 207–232.

CETESB (2016). Companhia Ambiental do Estado de São Paulo. Parecer Técnico n. 01/16/IE/ID.

CMR – Comisión Mundial de las Represas (2000). Represas y Desarrollo: Un Nuevo Marco para la Toma de Decisiones – Una Síntesis. Retrieved from: http:// chiltepines.files.wordpress.com/2012/09/represas_y_desarrollo_sc3adntesis-wcd.pdf.

COBRAPE (2020). *Companhia Brasileira de Projetos e Empreendimentos. Plano das bacias hidrográficas dos Rios Piracicaba, Capivari e Jundiaí 2020 a 2035*. Porto Alegre: Consórcio Profill-Rhama PCJ.

Consórcio Profill-Rhama (2020). Comitês PCJ/Agência das Bacias PCJ. Plano de Recursos Hídricos das Bacias Hidrográficas dos Rios Piracicaba, Capivari e Jundiaí, 2020 a 2035: Relatório Síntese. Piracicaba: Consórcio Profill-Rhama, p. 129. Retrieved from: https://drive.google.com/drive/folders/1H2dnKtMBr8i_fElX_U5__6NDu4fYpliI.

DAEE – Departamento de Águas e Energia Elétrica (2019). Relatório de andamento dos programas ambientais Barragem Pedreira: 1º relatório quadrimestral do programa de

controle e saúde pública. São Paulo, p. 487. Retrieved from: https://www.daeepedreiraeduaspontes.com.br/index.php/barragem-pedreira/relatorios-socioambientais.
Fearnside, P.M. (2016). Greenhouse gas emissions from Brazil's Amazonian hydroelectric dams. *Environmental Research Letters*, 11(1), 1–3. Doi.org/10.1088/1748-9326/11/1/011002.
Fearnside, P.M. (2017). Brazil's Belo Monte Dam: Lessons of an Amazonian resource struggle. *Die Erde*, 148(2–3), 167–184. Doi.org/10.12854/erde-14846.
Fearnside, P.M. (2019). Hidrelétricas na Amazônia: impactos ambientais e sociais na tomada de decisões sobre grandes obras. Manaus: Editora do INPA, v. 3.
Fung, Z., Pomun, T., Charles, K.J., Kirchherr, J. (2019). Mapping the social impacts of small dams: The case of Thailand's Ing River basin. *Ambio*, 48, 180–191. Doi.org/10.1007/s13280-018-1062-7.
Kirchherr, J., Pohlner, H., Charles, K.J. (2016). Cleaning up the big muddy: A meta-synthesis of the research on the social impact of dams. *Environmental Impact Assessment Review*, 60, 115–125.
RIMA (2013). Relatório de impacto ambiental barragens Pedreira e Duas Pontes. Consórcio HIDROSTUDIO – THEMAG.
Soares, A.B., Lázaro da Silva Filho, J.C., Cavalcanti Sá de Abreu, M., de Assis Soares, F. (2011). Revisando a estruturação do modelo DPSIR como base para um sistema de apoio à decisão para a sustentabilidade de bacias hidrográficas. *Revista em Agronegócios e Meio Ambiente*, 4(3), 521–545.
SVDS (2015). Secretaria Municipal do Verde, Meio Ambiente e Desenvolvimento Sustentável do Município de Campinas. Exame Técnico Municipal n. 169/2015-II.

Abstract

Water management: environmental and social impacts of dam construction

Brazil is well known for its biodiversity and water endowment. Due to its continental dimension, the distribution of water is quite unequal. The Brazilian National Water Authority identified different critical basins. Among them there is the Piracicaba-Capivari-Jundiaí watershed (BH-PCJ) located in the southeastern state of São Paulo. In the BH-PCJ live more than 5 million people, responsible for more than 5% of Brazilian GDP. In 2014 a severe water crisis affected the area, and strategic decisions for supply and water management were taken. Among them, a plan for building two dams to reduce the risk of a future water crisis. Although the benefits of dam construction are numerous, they have severe social and environmental impacts. From the literature review, there is evidence that environmental licensing has been weakened by different laws and constitutional amendments in Brazil. This research, based on official publications and legal documents, aims to describe the administrative process that led to the decision of dam construction and to evaluate its social and environmental consequences. This study showed that environmental licensing is an obstacle to be overcome instead of being considered an instrument for protecting environmental resources and promoting sustainable development.

Keywords: water crisis, sustainability, environmental law

Economic valuation of flood control ecosystem service in natural wetlands. State of the art

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1. Introduction

In the Latin American and Caribbean region, the most common natural disaster is flooding. These events have had serious social and economic consequences in the last 20 years. It is estimated that around 548 floods have been recorded in this region, leaving a total of 53 million people affected and economic losses of one billion US Dollars (United Nations [UN] 2020). Likewise, climate change has increased the frequency and magnitude of floods worldwide.

Wetlands help regulate extreme weather and water events such as floods, tsunamis, hurricanes, tropical cyclones and droughts. Wetlands function as natural protection systems against these types of natural disasters. In particular, marshy, lake and riparian wetlands and floodplains absorb and store excess water and mitigate the effects of flooding in the surrounding areas (Convención de Ramsar sobre los Humedales, 2016).

Wetlands control water flows and mitigate the effects of floods. Communities neighboring wetland areas do not perceive their benefits. So, the communities carry out activities and uses that degrade the ecosystem. In this sense, two phenomena are observed: a) the first is related to the natural

characteristics that allow broad economic development mainly in coastal areas, causing anthropogenic pressures due to industrial, commercial and urban settlements; b) the second is related to the social perception as low value areas, causing their drying out for cultivation or filling for agricultural uses. In both cases, the consequence is the accelerated loss of wetlands, increasing the vulnerability of communities to floods, which impacts social welfare.

Economic valuation uses a set of methods that allows estimating the monetary value of the ecosystem services of wetlands based on changes in social well-being. The economic valuation approaches of ecosystem services are divided into two: a) preferential and b) biophysical. The preferred approach forms the theoretical basis for Environmental Economics, and is based on the measurement of people's preferences, expressed either by the willingness to pay to improve the quality or quantity of natural resources in favor of people's well-being, or by accepting compensation for the damaging impacts. From this premise, it is possible to monetarily measure changes in environmental quality and quantity through direct or indirect observation of people's attitudes from the approaches of: a) market prices, b) revealed preferences, c) declared preferences and d) costs (Azqueta, 1994). On the other hand, the biophysical approach is based on the measurement of the energetic flows of the ecosystems, which forms the theoretical base for the Ecological Economy. The economic valuation of the ecosystem services of wetlands obtains basic information in decision-making when social well-being is affected by natural disasters such as floods.

Under this context, the present research aims to analyze the state of the art of the VESECI of wetlands. For this, the following questions are posed:

- What are the leading countries and the thematic areas that stand out in the economic valuation analysis of flood control in natural wetlands?
- What are the generalities (wetland type, approach, scale, methods) that stand out in investigations of environmental economic valuation of flood control in wetlands?
- What is the economic value of the ecosystem service of flood control in wetlands?

2. Method

For the construction of the state of the art of VESECI of wetlands, a systematic search for scientific information was carried out in the specialized database Scopus®. Different search equations were developed and the one that obtained the best results was selected. The determinants of the search included: terms in English only, search period between the years 2010 to 2020, and keywords related to wetlands present in the title of the publications. With the information, a bibliometric analysis was carried out, supported by network and density maps prepared in the VOSviewer® software. The scientific information

obtained was compiled and arranged in an Excel® database. The categories related to the type of wetland, study site, country, continent, study scale, method, ecosystem service and economic value were identified. Only 17 scientific articles were selected that made it possible to obtain most of this data.

3. Bibliometric analysis of the economic valuation of flood control service in wetlands

Different search equations were built and tested. An equation composed of 30 key descriptors was selected, and presented as follows: TITLE (*"wetland"* OR *"wetland ecosystems"* OR *"coastal wetlands"* OR *"coastal ecosystem"* OR *"floodplain"* OR *"flooded grasslands"* OR *"freshwater marshes"* OR *"mangroves"* OR *"swamps"* OR *"estuarine"* OR *"freshwater wetlands"*) AND TITLE-ABS-KEY (*"economic value"* OR *"economic valuation"* OR *"economic cost of floods"* OR *"service valuation"* OR *"cost avoided"* OR *"avoided cost"* OR *"indirect avoided cost"*) AND TITLE-ABS-KEY (*"flood"* OR *"inundation"* OR *"flood mitigation"* OR *"flood damage"* OR *"flood retention"* OR *"natural disaster"* OR *"direct damage"* OR *"water damage"* OR *"storm protection"* OR *"storm protection function"* OR *"protective seawalls"* OR *"storm trajectory"*) AND PUBYEAR > *2009*.

Results showed a total of 50 scientific papers. 82% were scientific articles, 10% were reviews and 4% were book chapters and conference papers.

Economic valuation studies about SECI (Flood Control Ecosystem Service, as per its acronym in Spanish) are present on all continents, but not in all countries. The Asian continent leads the investigations in economic valuation of flood control service in nine countries: China, India, Indonesia, Bangladesh, Hong Kong, Japan, South Korea, Taiwan and Vietnam. Altogether, they have developed 26 out of the 50 investigations found, with China being the one with the most investigations in the subject with 13 studies related to the subject of valuation. America is the second territory with the most accumulated investigations, in such countries as the United States, Canada, Mexico and Brazil. These countries accumulate a total of 18 VESECI studies on wetlands. The United States tops the list with 13 investigations. Europe quantified a total of 12 investigations in the field of the assessment of flood regulation. The Netherlands have generated five of these researches and Belgium, Denmark, Germany, Hungary, Italy, Spain and the United Kingdom have one study each. South Africa, Uganda, and Zimbabwe have made this territory visible with three valuation studies. Finally, Oceania and Australia have carried out five investigations on this subject.

The most relevant thematic areas in VESECI studies on wetlands are: Environmental Science with 37% of the studies in this regard, followed by Agricultural and Biological Sciences with 28%, Social Sciences with 12%, Environmental Sciences with Earth and Planetary with 8%, Biochemistry, Genetics and Molecular Biology and Engineering are represented with 3% each, while

Computer Sciences, Decision Sciences, Economics, Econometrics and Finance and the Multidisciplinary cover 2% respectively. Finally, the area of Chemical Engineering with 1% within the valuation studies.

The network and density maps allow us to analyze the semantics associated with the topic of this research. The network map (Figure 1) allowed us to visualize the co-occurrence of the key descriptors, which were grouped into three large clusters. The first cluster allows to identify that ecosystem services are strongly related to decision-making processes, flood control, water supply, and China. The second cluster showed that the word wetlands is linked to the terms floodplain, flood, climate change, and the United States. For its part, the third cluster showed that the term wetlands is strongly linked to economic valuation, mangroves, contingent valuation and their ecology.

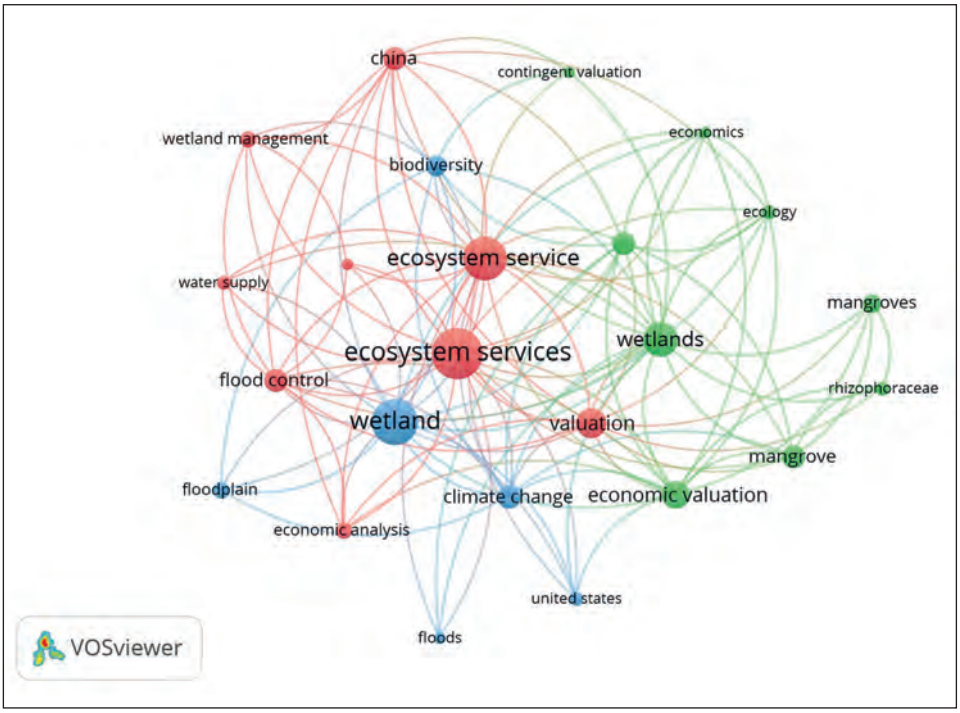


Figure 1. Map of co-occurrence networks of key descriptors for economic valuation of flood control ecosystem service

Source: Authors' elaboration, based on information from Scopus

The density map (Figure 2), constructed from 20 key descriptors, allowed us to identify that those closer to the yellow color have the highest co-occurrence and are located in the center of the map, while those closer to the green color are further away and can be viewed on the periphery of the map. The descriptors with the highest co-occurrence were: ecosystem services, wetlands,

biodiversity, ecosystems and valuation. The terms least related to the subject of study were: economic analysis, flood control, water supply, wetland management, China, climate change, ecology, mangroves, economic valuation and the United States.

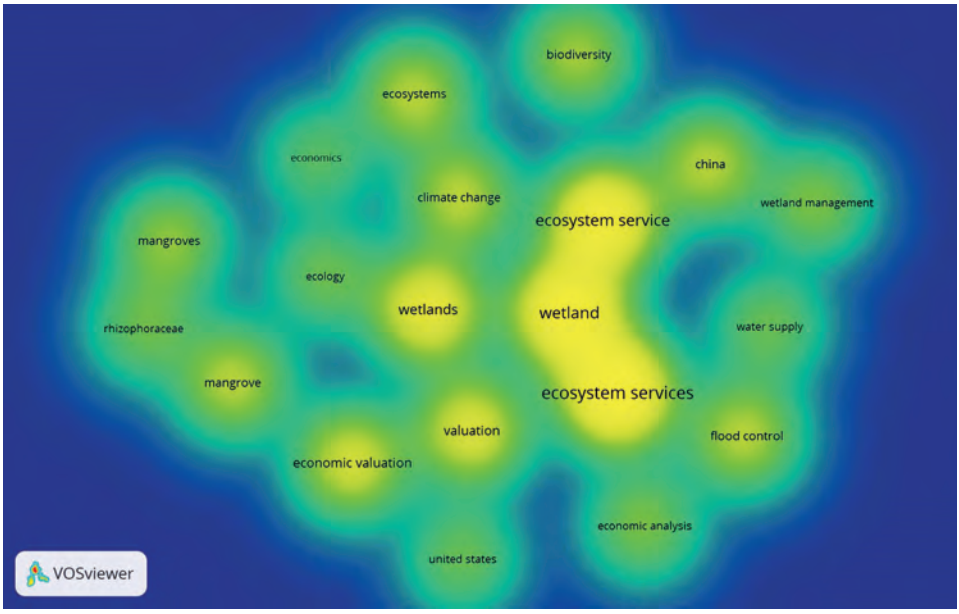


Figure 2. Density map of key descriptors with the highest co-occurrence in the investigation of the economic valuation of flood control ecosystem service

Source: Authors' elaboration, based on information from Scopus

4. Generalities of the economic valuation of flood control service in wetlands

VESECI in wetlands has been undertaken mainly from the Environmental Economy approach and in exceptional cases through Ecological Economy. Based on this approach, the Total Economic Valuation (TEV) and individual valuation of the ecosystem service of flood control have been used as valuation perspectives. Coastal wetlands, including mangroves, swamps and floodplains have been the most frequent object of study in economic valuation, analyzed from global, regional and local scales.

In most cases, economic valuation methods are combined to calculate the monetary value of the SECI (Flood Control Ecosystem Service). The most widely used valuation methods from the perspective of market prices are: market prices, the substitute market and the shadow price. The methods selected for determining the monetary value of flood control service are travel costs and

productivity approach. The preferred methods use contingent value; in the cost approach they use opportunity costs, replacement costs, and indirect avoided costs. The transfer of benefits is used when there are limitations in time and resources in the valuation projects of flood control in wetlands.

Finally, regarding the quantification of the impacts or damages caused by floods, it was found that spatial modeling through high-resolution cartographic and hydrodynamic methods allows for determining the magnitude of damage to people and infrastructure in wetlands. In specific cases, the modeling of the impacts of floods in wetlands has been used under different climate change scenarios, as well as in scenarios with and without mitigation of the effects of floods in the territory.

5. Economic value of the ecosystem service for flood control in wetlands

In Asia, China has been the country that has developed the most research to determine the VESECI in wetlands. In this country, riparian, lake and artificial wetlands have been studied, among which the Beijing wetlands (Zhang et al., 2017), the Baiyangdian freshwater lake (Jiang et al., 2017), the Xiaolangdi Reservoir (Liang et al., 2016), the Napahai Plateau in the mountainous area of Hengduan (Li et al., 2015) and the National Nature Reserve located in the basin of the Heihe River (Kong, Zhang, 2015). Regional and local scales are used to delimit the scope of investigations. The economic value of China's wetlands ranges from $ 2.355 billion USD for the Beijing wetlands to $ 35.27 million USD/2008 for the Napahai Plateau riparian wetland based on a surrogate market, which estimates the value of a service of the ecosystem based on the shadow price. In Sri Lanka, the provided SECI of marshy wetlands, estimated from the analysis of more than 30 case studies, has prevented damages worth $ 5 million USD/year (Mehvar et al., 2018). In Bangladesh, a case study estimated that relative sea level rise (RSLR) – induced flooding in coastal wetlands – has an economic value for potential losses such as the provision of raw materials and the provision of food, ranging from $ 0 to $ 1 million USD and from $ 16.5 to $ 20 million USD (Mehvar et al., 2019).

In America, the countries that have assessed VESECI in wetlands are Mexico and the United States. In both countries, coastal-type wetlands have been selected as the object of study, with floodplains, swamps and mangroves being the most frequently identified subtypes of wetlands. The study scales include both regional and local ones. In Mexico, flood prevention provided by wetlands on the Veracruz coast, based on the indirect avoided costs method was calculated at $ 148,277 USD/ha/2007 for flooded grasslands, $ 190,863 USD/ha/2007 for broadleaf in fresh water wetlands, and $ 193,674 USD/ha/2007 in the case of mangroves (Vázquez-González et al., 2019). Likewise,

flood regulation in the Usumacinta floodplain, based on the transfer of benefits, was estimated at $ 6,677 USD/ha/year (Camacho-Valdez et al., 2020). In the US case, the flood mitigation value of the coastal wetlands from the Otter Creek floodplain to Middlebury was calculated in the range of $ 126,000 USD to $ 450,000 USD. For this, the authors used hydrographs for scenarios with and without mitigation of flooding by wetlands upstream and downstream. In addition, they mapped the flood extensions for each scenario and calculated the monetary damages to flooded structures (Watson et al., 2016). On the other hand, in Barnegat Bay in Ocean County, New Jersey, direct flood damage avoidance was estimated at $ 625 million USD, using data on regional property damage from Hurricane "Sandy" and local storms. For this analysis, the Danish Hydraulic Institute's High-resolution Flood Model (Mike-21) was used to quantify the impacts of coastal wetlands (Narayan et al., 2017).

On the European continent, Spain and Hungary have valued the protection against floods that their wetlands provide. Wetlands in agricultural landscapes in Spain regulate floods, which have been estimated at an average of $ 6,923 USD/ha/year, with a median of $ 427 USD/ha/year (Brander et al., 2013). These authors state that variations in the amounts of regulation services are due, among other things, to differences in the type of wetland, size, scarcity or abundance of other wetlands in the surrounding landscape, and the socioeconomic characteristics of the beneficiaries of these services. However, these data can be used to estimate the value of regulatory services through profit transfer. In the Hungarian floodplain, Pinke, Kiss & Lövei (2018) found that the reservoir capacity of restored wetlands with an ecologically optimal water depth of 0.5 m could replace $ 2,515.5 USD ha^{-1} investment cost in flood protection.

In Africa, regional studies have been carried out in Kenya and Uganda to assess flood reduction and control. The mangrove swamp of the Tana delta in Kenya was part of a cost benefit analysis case concluding that it has helped reduce flooding in a range of $ 238 USD/ha/year and $ 311 USD/ha/year (Karanja, Saito, 2018), while in the Ugandan wetlands, the Total Economic Valuation (TEV) of the products and services was calculated in three wetland areas, using various valuation methods, including market prices, productivity and contingent valuation; it was found that flood control was of $ 1,702 million USD/ha/$year^{-1}$ (Kakuru et al., 2013).

Finally, in a global study carried out by Menéndez, Losada, Torres-Ortega, Narayan, & Beck (2020), probabilistic development combining spatially explicit 2-D hydrodynamic models and economic models was used, finding that the annual value of the protection service against floods by calculating damage to people and property reached up to $ 65 billion USD/year, affecting 15 million people. These authors point out that the countries that receive the most economic benefits from mangroves are the United States, China, India and Mexico, while Vietnam, India and Bangladesh receive the greatest benefits in terms of protecting people.

6. Conclusions

The main findings of this analysis show that SECI has been approached mainly from the thematic areas of Environmental Science. Likewise, the Asian continent is the one that generates most of the investigations in this regard, with China in the lead.

Coastal wetlands, such as mangroves, floodplains and swamps are the ecosystems where most of the economic valuations are carried out since they act as water regulators and on many occasions they have been territories occupied by urban and industrial development.

From the Environmental Economics perspective, it is estimated that the economic value of SECI ranges between $ 238 USD/ha/year for the mangrove swamp of the Tana Delta in Kenya at a regional scale, and that its highest value is around $ 65 billion USD/year for mangroves in a global scale study. For this purpose, government strategies protect the territory and prevent losses and damages to the population due to these natural disasters by formulating and developing structural containment systems and integrating risk management. In these strategies, the conservation of wetlands has not been considered transversally as additional or essential actions, nor as a fundamental element to mitigate the effects of natural disasters.

Latin America and the Caribbean is where most of natural flood disasters occur. However, the lack of information on the VESECI of wetlands from an economic-environmental perspective limits decision-making and the incorporation of holistic strategies in disaster prevention. It is worth mentioning that VESECI makes visible the importance of the conservation of the wetland resource as a fundamental part in the construction of resilient territories.

Bibliography

Azqueta, O.D. (1994). *Valoración económica de la calidad ambiental*. Madrid: McGraw Hill.

Brander, L., Brouwer, R., & Wagtendonk, A. (2013). Economic valuation of regulating services provided by wetlands in agricultural landscapes: A meta-analysis. *Ecological Engineering*, 56, 89–96.

Camacho-Valdez, V., Saenz-Arroyo, A., Ghermandi, A., Navarrete-Gutiérrez, D.A., & Rodiles-Hernández, R. (2020). Spatial analysis, local people's perception and economic valuation of wetland ecosystem services in the Usumacinta floodplain. Southern Mexico. *PeerJ*, 8, 1–26.

Convención de Ramsar sobre los Humedales (2016). Humedales: una protección natural frente a los desastres (Ficha informativa 9.2). https://www.ramsar.org/sites/default/files/fs_9_drr_esp_30j.pdf.

Jiang, B., Chen, Y., Xiao, Y., Zhang, J.J., & Ouyang, Z.Y. (2017). Evaluation of the economic value of final ecosystem services from the Baiyangdian wetland. *Acta Ecologica Sinica*, 37, 2497–2505.

Kakuru, W., Turyahabwe, N., & Mugisha, J. (2013). Total economic value of wetlands products and services in Uganda. *The Scientific World Journal*, 2013, 1–13.

Karanja, J.M., & Saito, O. (2018). Cost–benefit analysis of mangrove ecosystems in flood risk reduction: a case study of the Tana Delta, Kenya. *Sustainability Science*, 13, 503–516.

Kong, D.S., & Zhang, H. (2015). Economic value of wetland ecosystem services in the Heihe National Nature Reserve of Zhangye. *Acta Ecologica Sinica*, 35, 972–983.

Li, Y., Deng, H., & Dong, R. (2015). Prioritizing protection measures through ecosystem services valuation for the Napahai wetland, Shangri-La County, Yunnan Province, China. *International Journal of Sustainable Development & World Ecology*, 22, 142–150.

Liang, C., Xin, S., Dongsheng, W., Xiuying, Y., & Guodong, J. (2016). The ecological benefit-loss evaluation in a riverine wetland for hydropower projects-a case study of Xiaolangdi reservoir in the Yellow River, China. *Ecological Engineering*, 96, 34–44.

Mehvar, S., Filatova, T., Dastgheib, A., de Ruyter van Steveninck, E., & Ranasinghe, R. (2018). Quantifying economic value of coastal ecosystem services: a review. *Journal of Marine Science and Engineering*, 6, 5.

Mehvar, S., Filatova, T., Sarker, M.H., Dastgheib, A., & Ranasinghe, R. (2019). Climate change-driven losses in ecosystem services of coastal wetlands: A case study in the West coast of Bangladesh. *Ocean & Coastal Management*, 169, 273–283.

Menéndez, P., Losada, I.J., Torres-Ortega, S., Narayan, S., & Beck, M.W. (2020). The global flood protection benefits of mangroves. *Scientific Reports*, 10, 1–11.

Narayan, S., Beck, M.W., Wilson, P., Thomas, C.J., Guerrero, A., Shepard, C.C., ... & Trespalacios, D. (2017). The value of coastal wetlands for flood damage reduction in the northeastern USA. *Scientific Reports*, 7, 1–12.

Organización de las Naciones Unidas – ONU (2020). América Latina y el Caribe: la segunda región más propensa a los desastres. *Noticias ONU*. 03 de enero de 2020. https://news.un.org/es/story/2020/01/1467501.

Pinke, Z., Kiss, M., & Lövei, G.L. (2018). Developing an integrated land use planning system on reclaimed wetlands of the Hungarian Plain using economic valuation of ecosystem services. *Ecosystem Services*, 30, 299–308.

Vázquez-González, C., Moreno-Casasola, P., Peláez, L.A.P., Monroy, R., & Espejel, I. (2019). The value of coastal wetland flood prevention lost to urbanization on the coastal plain of the Gulf of Mexico: An analysis of flood damage by hurricane impacts. *International Journal of Disaster Risk Reduction*, 37, 101180.

Watson, K.B., Ricketts, T., Galford, G., Polasky, S., & O'Niel-Dunne, J. (2016). Quantifying flood mitigation services: The economic value of Otter Creek wetlands and floodplains to Middlebury, VT. *Ecological Economics*, 130, 16–24.

Zhang, B., Shi, Y.T., Liu, J.H., & Xu, J. (2017). Economic values and dominant providers of key ecosystem services of wetlands in Beijing, China. *Ecological Indicators*, 77, 48–58.

Abstract

Economic valuation of flood control ecosystem service in natural wetlands. State of the art

In order to build the state of the art of the Economic Valuation of Flood Control Ecosystem Service of wetlands (VESECI, as per its acronym in Spanish), a systematic review of scientific information was carried out through which a bibliometric analysis was prepared, supported by bibliographic maps of networks and density processed in the VOSviewer® software. Likewise, the information of scientific articles was arranged in an Excel® database, which allowed us to identify the generalities of the valuation

studies and obtain information on the economic value of flood control worldwide. The main findings indicate that the Asian continent leads research on the matter, with China being the country with the most research in this regard, and that the dominant subject area of research is Environmental Science with 37% of the studies found. The results showed that coastal wetlands, such as swamps, mangroves, and floodplains, are preferred in VESECI's analyzes. It was found that the Environmental Economics approaches have been the most used in this kind of studies and that the value of wetlands varies according to the valuation method used, the scale of the study and the type of wetland studied. In general terms, it is concluded that the value of flood control ecosystem service (SECI) ranges between $ 238 USD/ha/year and $ 65 billion USD/year.

Keywords: flood control, ecosystem service, mitigation, bibliometric analysis, environmental economics

VI. EDUCATION ABOUT AND APPLICATION OF SUSTAINABLE DEVELOPMENT

Earth science in education and its purpose in liquid modernity

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Proposal

In *Liquid modernity*, Zygmunt Bauman explores those attributes of capitalist society which have remained and changed over time. He seeks to underscore the traits that are somewhat visible in early stages of accumulation and which become central in the late stage of modernity.

Among these is individualism that marks our relationships and causes them to be fragile, transitory, and volatile. Liquid modernity is a representation of change and transience. "Solids retain their shape, and persist over time: they endure, while liquids do not. They transform constantly, or flow, as in market deregulation, flexibilization, and liberalization".

Bauman offers neither theories nor definitive systems, and rather limits himself to the description of contradictions, including social and existential tensions that are generated when humans interact.

Understandably, the unfamiliar irritates, offends, and unsettles, as its mere presence tends to overshadow and eclipse the sharpness of the frontiers that classify and organize the world in which we live. As such, it radically questions the presumptive, reciprocal comprehension of what "I" have with the "other" individual.

Liquid modernity is a time without certainty. Its subjects, who struggled to obtain civil liberties and be rid of tradition during the enlightenment, now see themselves saddled with the obligation to be free. We have transitioned from there to having to design our lives as projects and performances. Beyond said projects, everything is an illusion. Flexible work culture ruins future welfare, and undoes the meaning of professional careers and accumulated experience.

The nuclear family has become a "pure relationship", in which each "partner" can abandon the other at the first sign of difficulty. Love has become unanchored, devoid of responsibility towards the other, where its greatest expression is the faceless link offered online. Institutions are no longer the anchors of

personal existence. The welfare state is in decay, lacking collective stories that lend meaning to history or individual lives. We surf on the waves of a liquid, uncertain, and constantly changing society that is ever more unpredictable.

The uncertainty in which we live corresponds to transformations such as the weakening of security systems that protected individuals, as well as the abandonment of long-term planning. Obscurity and affective rootlessness seem to determine success. This new (in)sensitivity requires flexibility, fragmentation, and compartmentalization of interests and affections. One must always be willing to change tactics and abandon commitments and loyalties. Bauman refers to a fear of establishing lasting relationships and the fragility of supportive links, which seem to depend only on the benefits they generate. He seeks to demonstrate the way in which the commercial sphere permeates everything, and that relationships are measured in cost-benefit terms, or "liquidity", in the strict financial sense.

Bauman interprets provocative concepts, such as "human waste" to refer to the unemployed, or jobless, who today are considered "superfluous, excluded, sidelined". Half a century ago, the unemployed formed part of an active work reserve that waited in the wings of the work world for an opportunity. Today, conversely, "redundancy is discussed, which indicates that individuals are superfluous, or unnecessary, because the fewer the workers, the better the economy functions". For the economy, it would be better if the unemployed simply disappeared. This state of waste is a pact with the devil: with physical decay, death is a looming certainty. It is better to disengage quickly, as feelings may create dependence. One must rehearse the art of truncating relationships, disconnecting, anticipating decrepitude, knowing when to terminate contracts.

The "liquid" part of modernity – returning to Bauman's concept – refers to the conclusion of a stage of individual "encrustation" in "solid" structures such as the industrial production regime or democratic institutions which have had long-standing territorial holds. Now, "the secret to success lies (...) in avoiding converting the individual into the habitual". The appropriation of territory, once a resource, has become a burden, owing to its adverse effects on the masters: its immobilization, when linked to the unending, cumbersome responsibilities that inevitably accompany territorial administration.

Fears strike us, one by one, in constant, turbulent succession. They challenge our efforts (should we, in fact, make these efforts) to help and follow their path, in search of their common roots. This is, indeed, the only way to combat fears when they become irrational.

Knowledge in liquid modernity is valuable. It is supposed to endure, just as education holds value, insofar as its offering of knowledge of lasting worth.

There is no pleasure in learning, and so education is more a product than a process. A product is a thing to be acquired, and a process is a continual activity that lasts for a lifetime and is not subdivided into categories in the way that industrial processes are. One's appetite for knowledge must be insatiable over time.

As proposed by Italo Calvinoin the *Invisible Cities,* opulence is not measured by that which is purchased, but rather by that which is discarded. Knowledge, then, is seen as a disposable good, as a single-use product.

I. The notion of social responsibility

The word 'responsabilidad' (responsibility) is defined in María Moliner's Diccionario del Uso del Español as the quality of responsibility (being conscious of one's obligations), a term that may be expressed through words such as: accept, assume, contract, affront, decline, reject, demand, attribute, achieve, breach, have, feel, gravitate, gravitate, think, allocate, and prescribe. A 'responsable' (leader), according to the dictionary, is "the individual who is guilty of something, charged with something for which they must respond".

Both the word 'responsabilidad' and 'responsable' originate from the word 'responder' (respond) which comes from the Latin 'respondere', defined as promising one's future, promising or paying in turn, corresponding to, keeping the due proportion of one thing to another. Clearly, these words have evolved.

From the moral point of view, one may understand 'responsabilidad' as an individual's ability to learn and accept the consequences of their actions, or the form of administration and decision making that achieve or overcome the ethical, legal, commercial, or social expectations that society places on companies.

Throughout history, the notion of social responsibility has included various nuances. For example, in ancient Greece, responsibility was focused on the public, in the Middle Ages, on belief, and in the modern age, or contemporary age, the market.

In this sense, corporate social responsibility may be defined in several ways. On the one hand, the Colombian Institute of Technical Norms (Icontec) defines this as the voluntary commitment that organizations make regarding the agreed-upon expectations which, as regards integral human development, are generated with the interested parties, and that, based on compliance with legal provisions, permit organizations to ensure economic growth, social development, and ecological equilibrium.

A. Carroll sustains that corporate social responsibility encompasses the economic, legal, ethical, and discretional expectations that society has of organizations at a given time, and that corporation's social responsibilities may be described in such a way that they include economic, legal, ethical, and discretional, or voluntary responsibilities beyond those required by law.

The European Union's Green Book, assumes that corporate social responsibility is meant to elevate levels of human development, which supposes the adoption of open corporate governance models that reconcile the interests of various agents, within a global approach to quality and viability.

In accordance with the above, how can this be integrated into higher education?

To discuss university social responsibility, one must be familiar with societal interests as they relate to universities. The said institutions, as ethical projects, refer to the society to which they must contribute to work together with the remaining actors, from within. What legitimizes universities in society? How do universities exist and create, in terms of societal projects, whether well or poorly formulated, more or less known, in a concrete community, with permanent changes to their environments? In what way are universities ethical organizations?

Any reflection on university social responsibility must be framed within the concepts of human individuals, society, and universities. Human individuals determine that which a society is, and these together determine university characteristics, within the environment of knowledge. Social responsibility drives universities, based on a deep-seated concept of human beings (people as an ethical subject) and the corporate values derived from there. Therefore, universities can ever-more effectively accomplish their missions and respect their essence, through strategic objectives and programs that benefit the permanent construction and progress of the society to which they belong, in a changing world that must be continuously analyzed and evaluated. Universities, in a globalized world, project irreversibly toward democracy, autonomy, freedom, and decentralization, and have growing awareness of the need to establish ethical minimums and sustainable human development.

II. The purpose of universities

1. Judgements of whether or not universities comply with their societal function are broadcast with ever-greater frequency. The discussion of what they should do in order to derive the possible deviations that have occurred and reorient them, has become unavoidable. It has been affirmed that the university concept is not reflected in its actions, and as such, it must be restructured. As traditional as the said discussion may be, its significance remains, even more so for those who form part of universities. A variety of terms are often used to allude to university meaning when the said subject arises. Frequently, mission and function, which surely have different implications, are discussed. However, to use less empiricist language, as in the case of function, the use of the theological position would behoove participants in the said discussion, as it bases the university concept upon the supposition of a finality.

It is thus pertinent to indicate that the finality of universities coincides with the knowledge activity of all those complex objects that generate reflection. However, if they stall, and only produce or reproduce knowledge, this empiricist purpose would be insufficient, as man is more than nature, or pure factual interest, as is the case of freedom, in another dimension. Returning to universities' purpose, beyond scientific activity, let us refer to the fields of values, ethics, and therefore, freedom.

If science is no different from the casual description and explanation of objects at hand, only the comprehension of the meaning of those human actions that make use of knowledge derived from science would remain. The said nexus, which oscillates between explanation and comprehension, should constitute universities' purpose, as they serve the construction or reconstruction of knowledge, without separating it from its potential uses.

This means that the world of values, and as such, freedom, in which human actions acquire meaning, is that which determines universities' purpose, as inquiry into the meaning of and reason for human actions presupposes freedom of will, where finality may be discussed as purpose.

As such, the finality of universities concerns culture, understood as the amalgamation of science, values, and manifestations that emerge from the aesthetic expressive field.

University autonomy refers to that which abides by itself, or emits its own law. This, of course, does not refer to legal regulations, but rather ethical law. It thus does not manage the contingencies of the empirical world. Via ethical law, one may venture into society to decide to do whatever one's spirit dictates. Thus, that which universities do or not is not so much the result of normative bodies, such as policies: academic, investigative policies, etc. These policies may exist in written bodies, however, universities will not be what they should if their community does not refer to their inherent sense of ethos. The university is not an abstract concept that gives an account of the form. It also shows referred content to its members.

In other words, university autonomy is our own autonomy, from which point of view we seek to approach university finality. The separation established between the duty that emanates from autonomy and that which we effectively do comes from the primacy that the world of contingencies acquires when hedonistic interest dominates our actions. This is typical of bureaucracy, entrepreneurs, and businessmen, etc., but cannot be the interest of the person who, autonomously, has decided to relate to knowledge as the finality of a life.

It is our inclusion in knowledge and culture, which imposes this ethos particular to the university institution, and which no empirical law may act to channel if not contained as tradition or history.

A lack of ethos in the university community is the absence of an illustration story, which of course causes the dominance of professional meaning in academic actions, instead of the meaning of a life that has resolved to encounter the finality of knowledge in and of itself.

This is the nucleus of a great many setbacks, of isolation, disaffection, and all manifestations that, prior to the instauration of communication and rational dialogue, hamper an effort that aspires to reconcile the ethos of a given community with that of the university.

As an intrinsic principle, the university does not set out simply to proclaim, but rather to wield, autonomy. Wielding autonomy is not just

a question of university management, a faculty, or school. It is a question that involves all of those that form part of an autonomous community in the field of knowledge.

As such, what the university should be never depends on leadership, a concept of power or political relationships. It depends on the exercise of an autonomy that becomes the finality of knowledge.

The emergence of universities in the absence of an illustratitive period in history reduced and weakened their ability to influence social life. Without this, or greater resistance, it was made the center of the political exercise, and as a result of this burden, there remain, locally, ways to interpret possibilities for its reorientation. Leadership might be demanded, for example, to which one would have to respond that science, ethics, art, and culture in general is where the university concept lies. It is not a question of leadership, more a nefarious idea. Leading implies obedience, loyalty, charisma, as described by Max Weber, with his meticulous spirit in comprehensive sociology, in the study of different types of power policies. In culture and science, there cannot be relationships of obedience, but rather radical adhesions to principles and theories, in virtue of their consistency. As such, science and culture have been disloyal, even for those whom, at certain points in time, received the greatest distinctions, as the concept of autonomy and liberty is incompatible with the concept of leadership, and these mark the difference between universities and political associations. Given that the first surrenders extreme fidelities to affirm its own obedience, homegrown from its foundation, *freedom* means that universities cannot be the center of political action with the goal of power. This does not mean that they should not address politics, but rather that professors should abstain from playing politics when they study or attempt to comprehend political action. Doing so would introduce dogmatism, and inevitably culminate in *social domination*, as occurs in the west, and later in Europe and the east.

It is thus within the context of permanent communication, in an academic community, that the interest in reflection, governed by principles, is constructed by the university. It includes: *knowledge, ethics, autonomy, and investigation*, as the aspiration to cultural education, not the rupture of internal *dialogue*, which necessarily culminates in irrationality and indifference. These could promote the ability to guide interest toward *school renewal*, in accordance with the requirements of the present times, such that the more is robbed from this spirit, the further we are from the ability to achieve a finality. This, from the university point of view, is expected of public figures that conform to society, as illustrated by Wright Mills when he refers to the great promise of social sciences.

It is the restauration, if this has, in fact, existed, of communication and dialogue in the university community, which must be the first task of school administration and professorial staff. It would be senseless to attend to all of those actions which do not consider restauration.

2. Investigation. Despite the fact that the world 'investigation' is embedded in academic language, it has never designated that which, with a less ritualistic and more solemn meaning today, is required by the academic public, society, or state, and is just comprehensible, given that it concerns something novel and overdue for the university model that has prevailed in society in the 1940s. In those years, certain events were organized, without significance or continuity. The concept was rediscovered in the 1960s, and culminated in the creation of the National Science and Technology Council (COLCIENCIAS), at the height of 1968-1969. Later, in 1978, certain universities in Bogota and the rest of the country attended the forum coordinated by ESAP to establish a balance in the *State of Scientific Investigation in Colombia.* Thereafter, advances on the topic were gathered on the basis of the Science and Technology mission report.

The recognized intellectual and scientific prestige of participants, the depth of the reflections consigned, and the decision to found thereupon a national policy for culture, science, and investigation, caused the largest movement of concern and interest in national university campuses to date, which may translate into a new awareness of the fundamental role of universities. However, this new awareness cannot be separated from the long history of disinterest and conditions that were withheld from university centers for investigative production. These are today demanded as fundamental for universities and for national modernization.

This is just one aspect whose capacity for transformation is associated with structural changes in national universities, professorial selection processes, instructor roles, socioeconomic status and academic curricula. It is a slow process that cannot aspire to substitute a tradition founded in orality, with another that is inscribed in written tradition and investigation. Knowledge and investigation is historico-contextual. This comes from within a culture that converts interest in exploration into necessity, and permits the construction of social meaning, from the being of life, and in function thereof. It is a university system supported by principles which come from the exhortation of professionalization to promote social mobility and efficiency, in the technical-business sense, and competency for success in the work world, and cannot suddenly access functions for which they were not created.

Undoubtedly, it must be recognized that the lack of clarity regarding the role and orientation that universities should follow, in the group of university administration, postgraduates, schools, and professors in general, has permitted that pulse of events to be the mark that suggests the meaning of actions that determine its progress. We have erred, in good faith, because with the vision of our cultural and academic formation of the world that surrounds society, investigation, as an essential value, was never written in the model of the university of which we are an expression, nor could the immediatism that euphorically convenes to deploy investigation otherwise be explained.

The idea is not to develop an antinomist position along these lines, or opposition to a law that investigation demands, by way of university policy.

The objectionable part is that, when investigation is demanded, budget resource restrictions are announced for university activities, and so they are compelled to self-finance by way of a *technical service sales model*. However, technical services, such as consultancy, are quite different from *investigation*. Investigation cannot ensure immediate results within defined timeframes, as would be expected from economic investment. Thus, investigation, owing to its elevated cost, cannot occur in universities that operate within frameworks of poverty. In Latin America, it has occurred not only in universities, but also in foundations.

Firstly, universities must be open to all demands formulated by public and private institutions, in terms of investigation, consultancy, and outreach. However, the decision to participate is not influenced only by economic magnitude, as is the propensity of those who lack the said resources, but rather by the intimate connection between the proposed field and the academic curriculum. In other words, acceptability will be determined by that which investigative results may say about a school, in areas that are hierarchically organized, in terms of education in a particular discipline.

If the interest is the meaning of expected research project results, one creates distance from the idea of monopolies and statistical rankings will not garner as much interest. These have always been used to evaluate university work, and in some way, have contributed to the construction of not only the university, but also our lives, in the said terms.

In this sense, the importance of universities is not that they participate in 70% of the projects registered in *Colciencias* or in the respective vice-chancellorship, but rather that they have achieved, in some cases, extraordinary results.

In this case, with minimal experience, perhaps, two or three projects per academic unit suffice for complete university backing to begin a tradition in this field.

However, we do detach ourselves from the reflexive and ethical spirit, which specifies the merit of that which should be investigated because we determine that all university action in investigation and consultancy emerges from and agrees with that which it must do, or because a rector, dean, director, etc. decides to do things a priori. Anyone, then, may shoulder the university and its professorial bodies, and put them at the service of the most dull or damaging project, as it has occurred in many cases in history.

The focus is not the autonomy of a given school or its research center. This concept merits discussion before the height of its comprehension, so that it may be established whether that which is externally proposed is compatible with the interests of a discipline that seeks to enrich the knowledge base.

If we do not establish a difference in which rationality prevails with values over economic interest, there will be no distinction between consulting firms and universities. Today's universities do not worry so much about what they should do, but rather what they have to do, owing to the determination of a mandate from the empirical world: *The market*, following the requirements

of the present new liberal order has been able to invest in the Comtian concept's **freedom-necessity** relationship, in which freedom represents a principle of hostility to the order of need.

This form of thought corresponds with the latest developments in social science, particularly with those disciplines that decided to break with the influence of social philosophy to become social engineering, in accordance with Bertrand Russell's illusion. He, imbued in the tradition of his time, always envisaged the day in which human behavioral mathematics would become as precise as mechanical mathematics. Regarding this growing devaluation of the human world and splendorous advance of the natural and technical sciences, perhaps discussing the role of universities to educate is no longer relevant. However, the more deprived and impoverished they become in their aspiration to civilize, the closer they get to the possibility of barbarity.

Aesthetic education, then, is no longer important in the architects. The important part is their training to design invisible, but successful, homes for the market. Economic schools will do the same, as the market requires very good economists from the technical point of view.

III. Social responsibility challenges for Colombian universities

What should be the goal of today's Colombian universities? Universities are players in an ethical-political regional and national construction project to which all of its educational activity is directed. The said dynamizing educational knowledge project is a creator of transformational thought, in which professionals, who will then construct the prosperous, fair country that Colombian society deserves, are educated.

We must recognize that the university has not contributed significantly to the establishment of the bases for a fructiferous dialogue between Colombians. It has not found a way to exert its intellectual leadership in the analysis and overcoming of disharmonies that fragment society. Society itself and the government do not recognize its role, and on occasion, even fail to provide the necessary space for this to be exercised.

How must we "do university" in this country, and in the current globalized context of ideas, values, technologies, capitals, and products, democratization, decentralization, and greater awareness of sustainable human development? What should be the university's role, as an institution and interinstitutional dimension in the construction of Colombia? What is its responsibility in the study, comprehension and creation of appropriate solution formulas, in order to overcome the chasms that separate us from being a nation and halt societal economic, political, and social performances, create structural disharmony that defines the non-peaceful situation: poverty, inequality, violence (common crime, guerrilla warfare, and paramilitarism), corruption and mafia culture, disconnection between the economy, well-being, property concentration,

and territorial disassembly? In a country that does not understand its own problems or recognize its potential, academia should provide the necessary assurance, derived from rigorous debate and knowledge.

In dialogue with other social actors, we must arrive at a shared diagnosis, in which the university provides decanted theories, complex analyses, and responsibility values, and learns from individuals' expertise and experience. Dialogue must be the basis for the creation of "learning communities" that, founded on a rigorous study of Colombian history, as a source to comprehend what we are and can be, generates realistic solutions.

The mediocrity of obtained achievements to date, in terms of well-being and progress, is the result of players with weak decision-making, contribution, and participation abilities (social fragmentation), which interact with poor-quality rules and values (institutional fragmentation), in regions weakened by centralism and clientelism owing to inconvenient populating dynamics and violence (territorial, political, and economic fragmentation).

Economic fragmentation: we have constructed an "external economy"

The results of the Colombian economy are unsatisfactory and are far from being able to offer adequate support for social harmony and peace. There is a disconnection between economic activity and value generation. On the one hand, there are well-being and population living conditions. On the other, we have constructed an "external economy" characterized by an extreme concentration, both personal and spatial, of income and property, and an economic structure that reinforces this with the anomalous growth of informality (for survival), a low rate of surplus reinvestment (businessmen do not see the opportunities), and poor resource allocation.

With results such as those obtained to date, it will not be possible to generate sufficient jobs or offer well-being levels comparable to those of developed nations. An average growth rate of 3.5% for the past century is insufficient for the eradication of poverty. The fact that half of the population is poor, and that one fifth is below the subsistence level, is not only a result, but also a cause of the Colombian economy's mediocre performance.

The economic structure continues to be predominantly lagging and non-productive, as a result of anticipated deagriculturization and tertiarization processes, and of the expansion of the non-productive informal sector. Both technologically and scientifically lagging, the country continues without the creation of a definitive, effective option for knowledge, science, innovation, and technology as keys to more effective exploitation of the assets that differentiate us. Productive activity, concentrated in few regions and cities, neither sufficiently exploits the country's natural resources, nor its biological, geographical, or cultural diversity.

Bibliography

Bauman, Z. (2003). *Liquid modernity*. Mexico: Editorial Economic Culture Fund.
Bauman, Z. (2005). *The challenges of education in liquid modernity*. Mexico: Editorial Economic Culture Found.

Abstract

Earth science in education and its purpose in liquid modernity

In *Liquid modernity*, Zygmunt Bauman explores those attributes of capitalist society which have remained and changed over time. He seeks to underscore the traits that are somewhat visible in early stages of accumulation and which become central in the late stage of modernity.

Keywords: liquid modernity, Bauman, Bauman's theory, social responsibility

"How were we supposed to know?" – the problem of embedding education for sustainable development in the learning process. Examples of New Zealand, France and Poland

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Introduction

Although Education for Sustainable Development (ESD) has been around since the 1970s, the issue is now pressing. The quantity and quality of SD content in school curricula needs to be thoroughly revised and a strategy for embedding ESD in the learning process modified. New Zealand has already done so, and the process is underway in France. Poland is an interesting case as most of the scientific community accepts the existence of anthropogenic climate change, but, the education system barely recognizes the epochal post-2015 transition to achieve zero-net emissions.

Education for Sustainable Development

Education for Sustainable Development (ESD) as defined by UNESCO, its leading agency, is an approach to teaching and learning that "allows every human being to acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future." (UNESCO, 2012). Indeed, education has been repeatedly proven to be a driver of development and social progress (Fägerlind, Saha, 1983; Benavot, 2002). Therefore, when faced with the challenges resulting from unrestrained industrialization, such as climate change, income inequality, consumerism, and harm to biodiversity and the environment, the global community naturally turned to education as the key enabler for sustainable development.

Ever since environmental education began to appear on conference agendas in the 1970s, the call for a "common endeavor and the new norms of behavior at all levels" has been repeated at every major sustainability milestone: The 1987 Brundtland Commission Report; The 1992 and 2002 UN Summits; and more recently, the Decade of Education for Sustainable Development (DESD), organized by UNESCO in 2005-2014 (Wals, Kieft, 2010; World Commission

on Environment and Development, 1987). The resulting document, titled "Framework for the UN DESD International Implementation Scheme", set the tone for all DESD actions. ESD was supposed to be mainstreamed into educational systems by embedding it in existing curricula, rather than introducing it as a separate subject (UNESCO, 2006). The argumentation for this approach is presented in Figure 1.

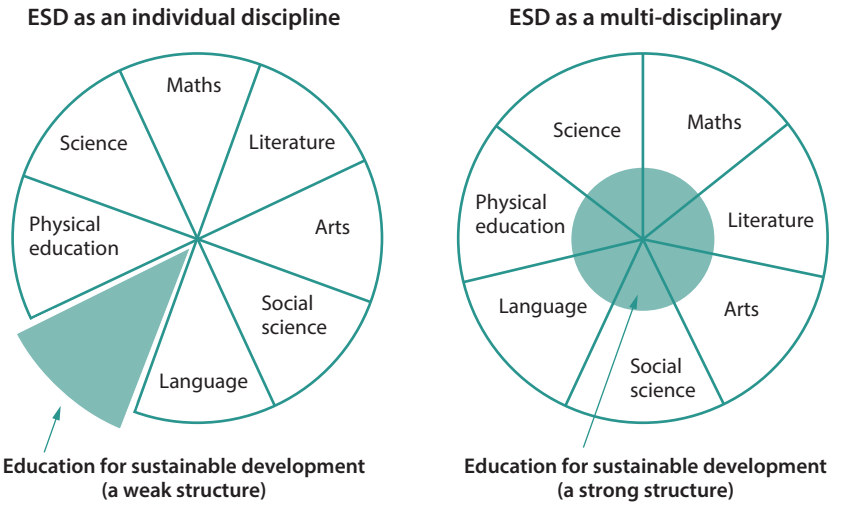


Figure 1. UNESCO approach to embedding SD in learning process

Source: UNESCO, 2006

Introducing ESD as a discreet subject was said to create a "weak structure", whereas making it a multidisciplinary subject was said to create a "strong structure". Unfortunately, the documents summarizing DESD and its efforts towards building a "strong structure" reported outcomes that were far from satisfactory, regardless of whether the approach was bottom-up, top-down, or horizontal. Admittedly, 10 years of ESD focus had put sustainability on the map and created a certain momentum, but ESD had still not been institutionalized, and was facing some critical challenges, mainly an absence of ESD strategies and a lack of leaders, teachers, and curriculum developers with the necessary commitment and competence (Buckler, Creech, 2014). The 2015 European DESD summary concluded that there was no overall institutional commitment to DESD, as decision and policy makers were resolutely adhering to the "industrial growth" model. The authors[1] of the summary proposed an

[1] Many of the authors involved in this European Report are members of the Environment and School Initiative (ESNI), an OECD network founded in 1986. ESNI collects the experiences of educators from all over the world and is focused on implementing ESD in the educational system (Jucker, Mathar, 2015).

ambitious alternative, viz. a new educational system where SD content was neither embedded in, nor added to the existing curricula, but where every subject contributed to realizing the assumptions underpinning SD (Jucker, Mathar, 2015). Similarly, the post-DESD Asia-Pacific Centre of Education for International Understanding, despite reporting insufficient DESD results, urged persistence in having ESD mainstreamed into all facets of the learning environment by having sustainability embedded in curricula and learning processes. No mention was made of introducing SD as a separate subject (APCEIU, 2016).

Since the 2015 Paris Agreement, UN programs have been pushing for a more rapid transition towards sustainability in line with the 2030 Agenda for Sustainable Development (UNESCO, 2020c). The DESD was succeeded by the 2015-2019 Global Action Program, and in 2020, by a new UN framework named ESD for 2030 (UNESCO, 2020a; UNESCO, 2020b). The primary purpose of these two programs is to implement the SDG 4, especially point 4.7, as part of the UN's 2030 Agenda for Sustainable Development[2]. These efforts are reportedly bringing about the desired outcomes in several countries (UNESCO, 2019).

Methods

Primary and secondary education in New Zealand, France and Poland was analyzed in terms of: the implementation of ESD as a separate subject; ESD textbook(s); ESD methodology; the embedding of ESD in national curricula; ESD teacher training; and institutional engagements in SD programs and initiatives. Governmental documents, such as teaching curricula, syllabuses and official websites dedicated to didactic SD measures in education, served as the primary source of information. In addition, inquiries were sent to relevant offices regarding access to public information and the existence (or lack thereof) of SD textbooks authorized by the Ministry of National Education.

The main online sources of information for New Zealand were the New Zealand Curriculum On-line and the New Zealand Qualifications Authority sites, and for France, the Ministry of National Education and Youth's ESD website (fr. *l'éducation au développement durable*), and Éduscol, the official portal for education professionals. Unfortunately, Poland does not currently have an official ESD website so there will be a brief analysis of official Polish government

[2] SDG 4: "By 2030 ensure all learners acquire knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development." (UN, 2015).

websites that publish ESD-related content. The main sources of information for Poland are therefore the Ministry of National Education's responses to the author's inquiry of Jun. 11, 2020, and to the inquiry of the Polish Ombudsman's Office dated Jan. 13, 2020.

The author's official inquiry to the Ministry of National Education contained the following questions: "1. In view of the lack of a separate subject and relevant teaching curriculum, how are children and youth in Poland educated on SD-related issues, and how are they being prepared for the consequences of climate change? 2. What, if anything, is being done to produce a Sustainable Development textbook? Are there any plans to introduce a Sustainable Development discipline in the school system? If so, I respectfully request that you provide details or refer me to a relevant document. 3. Who was responsible for overseeing the content of the classes broadcast by Polish State Television (TVP) during the online teaching that took place from March to June 2020? To whom should the content of these classes, which opposed the teaching curriculum and contradicted the official scientific position, be reported?".

The Ombudsman in his official inquiry to the Ministry of National Education asked the Minister to consider introducing to schools a course on climate change and counteracting its effects.

Table 1 summarizes the sources used for the analysis of each country.

Table 1. Main sources of information on implementing ESD in New Zealand, France and Poland – a summary

New Zealand	New Zealand Curriculum On-line	https://nzcurriculum.tki.org.nz/Curriculum-resources/Education-for-sustainability/EfS-in-schools#collapsible3
	New Zealand Qualifications Authority	https://www.nzqa.govt.nz/ncea/subjects/education-for-sustainability/levels/
France	Ministry of National Education and Youth's ESD website	https://www.education.gouv.fr/l-education-au-developpement-durable-7136
	Éduscol, the official portal for education professionals	https://eduscol.education.fr/1118/qu-est-ce-que-l-education-au-developpement-durable#lien2
Poland	Ministry of National Education's response to the author's inquiry of Jun. 11, 2020	See the present article's Methods
	Ministry of National Education's response to the inquiry of the Polish Ombudsman's Office dated Jan. 13, 2020 .	https://www.rpo.gov.pl/sites/default/files/Odpowied%C5%BA%20MEN%20ws%20edukacji%20klimatycznej%2C%2024.01.2020.pdf

Source: Author's elaboration

Results

New Zealand

New Zealand has introduced a full course in the secondary teaching curriculum entitled "Education for sustainability", and Ruth Neumann's 2011 "Sustainability" is the course textbook. Moreover, ESD content is consciously embedded in the learning process, as depicted in Figure 2.

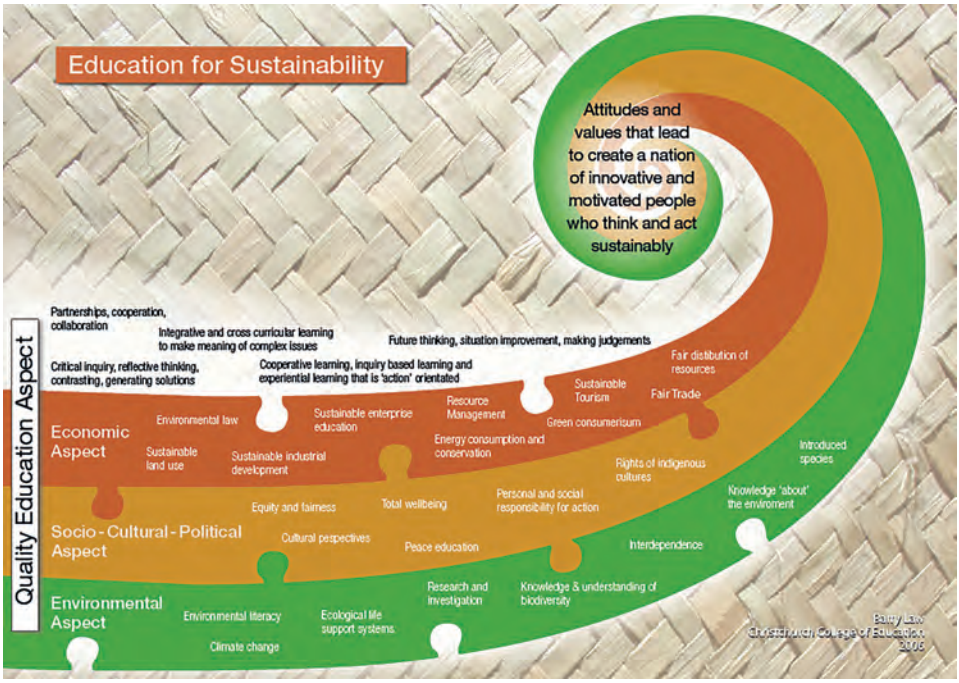


Figure 2. ESD embedded in New Zealand's educational system

Source: https://nzcurriculum.tki.org.nz/Curriculum-resources/Education-for-sustainability

The country has clearly defined criteria of competence for SD teachers, and to this end, offers professional training. In addition, there are a plethora of initiatives and programs, all of whose contents are thoroughly assessed and results scrupulously evaluated. These include: Enviroschools – a holistic program that supports schools in taking a whole school approach to sustainability; TKI Education for Sustainability, which provides information on ESD for teachers; See Change, which aims to raise the level of debate on education for sustainability; Environmental education in New Zealand schools: Research into current practice and future possibilities – this is research made available by the Ministry of Education.

France

Pursuant to a 2019 teaching curriculum reform, SD was introduced as a second-year high school subject in the Science and Technologies of Industry and Sustainable Development (STI2D) stream, which leads to the STI2D *baccalauréat* (high school graduation qualification). An SD textbook was published in 2019, and a workbook in 2020. The first year of high school also has SD content included in the methodology of other subjects, especially Geography (whose textbook is titled "Societies and sustainable development"). In addition, there is a clearly laid out strategy of introducing ESD in the learning process. ESD is embedded in the education system through relevant issues in the curricula of other disciplines, teachers training and university courses, school projects, official teaching materials, and incidental initiatives (e.g. school camps). The main nationwide projects supported by the Ministry of National Education are: Sustainable Development Schools (E3D) (to obtain an E3D certificate, a school must fulfill stringent requirements and submit its portfolio to a jury of professors from their local university); and CUBE.S, where schools compete to reduce their energy consumption.

These curriculum changes resulted from implementing a cross-sectoral framework titled "National strategy of ecological transition towards sustainable development 2015–2020".

Poland

Poland has not introduced a SD into the secondary curriculum as a separate subject or produced an SD textbook. The available information is scarce and difficult to find. The few websites with information on SD and ESD are outdated, incomplete, and do not form a logical reference structure.

There are 3 governmental websites that provide some information on SD and ESD. One is the Ministry of Environment site, which has materials for teachers[3]. This can hardly be considered a resource as it was last updated in 2011 and refers to a curriculum that has not been in use for at least 3 years. The other ESD-related official website is the Education Development Center's Global Education page[4]. This was set up under the Ministry of Foreign Affair's Polish Aid Program for 2016-2020, and was last updated in late 2019. Finally, the official governmental site with e-materials for students and teachers contains 23 ESD related lesson scenarios targeted at primary school level and 89 targeted at secondary school level. The materials cover a variety of topics found in 14 different disciplines[5].

[3] https://nauczyciele.mos.gov.pl/index.php?mnu=92 (access: 2.12.2020).

[4] https://edukacjaglobalna.ore.edu.pl/ (access: 2.12.2020).

[5] https://epodreczniki.pl/szukaj?query=zr%C3%B3wnowa%C5%BCony+rozw%C3%B3j (access: 2.12.2020). This is the website where the "educational video", claiming that climate change will bring considerable benefits (e.g. making harvesting possible twice a year in certain parts of the world), was posted https://naukaoklimacie.pl/aktualnosci/klimatyczny-galimatias-na-stronie-men-414 (in Polish).

A brief description of the role of ESD in the education system was published by the Ministry of National Education on Jan. 15, 2020. This is similar in content to the response to the Ombudsman's inquiry of Jan. 13, 2020[6]. It could be inferred that the content on the Ministry's website was only posted following the Ombudsman's inquiry. The Ombudsman, prompted by the many scientists who had repeatedly been expressing their concerns regarding climate change and its predicted consequences, asked the Ministry whether it was planning to increase the quantity and improve the quality of the relevant content in Polish schools by introducing a course on climate change. In its response, the Ministry stated that "there is a link between the climate crisis and human rights", and affirmed that ESD had been included in the teaching curriculum for years. The Ministry further claimed that teachers could devise SD-related content based on the syllabuses of their respective disciplines, but did not name any source (book, website, etc.) of SD teaching resources or appropriate methodology. Finally, two projects were mentioned as flagship governmental ESD initiatives. The first was the aforementioned Global Education project, realized in conjunction with the Ministry of Foreign Affairs. The project webpage does not contain any evaluation or give any verifiable or quantified results. Moreover, it has not been updated since 2019. The project's stated main goal was to prime Global Education leaders. The Ministry gives the following details of this 2-year project: 24 ESD trainers, 256 regional leaders, 39 training sessions and 15 conferences in 2018. A continuation of the project, titled "Young leaders for Education and Global development", is planned for 2021, but there is no concrete information online as to what it is going to consist in. The Ministry deemed this sufficient to "promote ESD" in Poland's "formal and non-formal educational system".

In its response dated Jun. 25, 2020 the Ministry declared, as it did in its response to the Ombudsman, that ESD had been included in the teaching curricula for several years. In its response to the second question, the Ministry stated that there were no plans to introduce any new disciplines, as the teaching curricula had been reviewed (for primary schools in 2017, and secondary schools in 2019) and were, according to the Ministry, comprehensive and up-to-date. That being the case, it continued, there could be no question of commissioning an official SD textbook. The Ministry denied responsibility for the proliferation of content opposing the teaching curricula and contradicting the official scientific position broadcast by TVP during the classes televised in the spring of 2020, as "the final decision on which teachers and other experts would implement the project was, and remains, solely within the purview of the Polish Television Network.". The most recent Polish report on the

[6] Cf. the Ministry's response to the Ombudsman's inquiry: https://www.rpo.gov.pl/sites/default/files/Odpowied%C5%BA%20MEN%20ws%20edukacji%20klimatycznej%2C%2024.01.2020.pdf and the Ministry's website: https://www.gov.pl/web/edukacja/tresci-z-zakresu-edukacji-o-zrownowazonym-rozwoju (access: 7.122020).

state of ESD in schools is dated 2012 and was published by the Ministry of Environment.

Table 2 summarizes the results of the analysis for New Zealand, France and Poland.

Table 2. ESD in New Zealand, France and Poland – a summary

	New Zealand	France	Poland
ESD as a separate subject	YES	YES	NO
ESD textbook	YES	YES	NO
ESD methodology	YES	YES	NO
ESD embedded in the texts of national curricula	YES	YES	Hardly
ESD systemic teacher training	YES	YES	Hardly
Institutional engagements in SD programs and initiatives	YES	YES	Hardly

Source: Author's elaboration

Discussion

The paucity of official government documents and websites containing information on the role of SD in Polish national school curricula demonstrates that ESD is not treated anywhere near as seriously as the necessary lifestyle adjustments warrant and that neither students nor teachers are equipped with the knowledge and skills required to make those adjustments (Mróz, 2018). It is also curious that, while the Ministry agrees that there is a link between climate change and human rights, it does not affirm the Polish scientific community's official stance on anthropogenic climate change[7]. In fact, this stance is not cited with a source or quoted verbatim in any government document currently in force. Moreover, while the Ministry asserts that the quantity and quality of SD in Polish schools is satisfactory, and that nothing therefore need be done to improve it, it does not cite any current research to support this claim.

The Polish government has fallen far behind in implementing ESD. Furthermore, it does not evince any need or urgency to do so. The consequences of this inaction will be at least twofold. First, society will remain ignorant of the adjustments that every signatory to the Paris Agreement is obliged to make by 2030. This is compounded by the absence of any national debate on the issue. Second, Polish youth will not be equipped with the knowledge and skills that will be demanded by SD technology industries, let alone their R&D vanguard.

[7] The General Assembly of the Polish Academy of Sciences official stances of 2007 and 2019.

Although Poland has missed its chance to be a trailblazer, the experience of other countries in embedding ESD in their education systems can assist in introducing the necessary changes effectively and quickly. France offers a spatially and temporarily proximate example of how a systemic approach can result in an effective ESD implementation. The country's teaching curriculum is rich in SD content, and it has an official textbook and two major websites with plenty of references and resources. New Zealand, which has enjoyed well-organized ESD for over 10 years, provides examples of effective long-term ESD policies.

The examples of France and New Zealand show that successfully implementing ESD in schools requires a systemic effort to train teachers, reform curricula, and provide materials. Both countries have introduced SD as a separate subject in defiance of UNESCO's edict to the contrary. It is worth stressing that introducing SD as a separate subject not only firmly embeds SD in the school system, but also creates a rationale for devising a syllabus and producing an official textbook. This in turn facilitates discussion of SD issues by introducing a standard nomenclature into the national language. It also opens up opportunities in the now booming SD technology industry (Georgeson, Maslin, 2019).

Conclusion

Embedding ESD in the learning process is a major challenge that should be part of a broad national strategy to make the transition towards more sustainable development. Despite the claims of the Polish Ministry of National Education, there is no credible evidence that the country has made substantial progress in implementing ESD or even that it intends to do so. ESD is considered an add-on, or a nice-to-have, and is therefore left entirely to the discretion of individual teachers, who are neither trained nor equipped for it. The result is that Poland now faces an enormous challenge in building SD awareness in schools and other institutions. Declining to accept this challenge would be tantamount to willfully relegating the country to a backwater by refusing to make the most significant and far-reaching lifestyle changes imposed on humanity since the industrial revolution.

Bibliography

Asia-Pacific Centre of Education for International Understanding (APCEIU) (2016). *Sang Saeng. Ensuring Learning Outcomes,* Seoul.

Benavot, A. (2002). A Critical Analysis of Comparative Research. *Prospects,* 32(1), 51–73. Doi.org/10.1023/A:1019796410415.

Buckler, C. & Creech, H. (2014). Shaping the Future We Want. UN Decade of Education for Sustainable Development (2005–2014): Final Report. Paris: UNESCO.

Druckman, A., & Jackson, T. (2016). Understanding Households as Drivers of Carbon Emissions. In: R. Clift & A. Druckman (eds.), *Taking Stock of Industrial Ecology*, pp. 181–204.

Dubois, G., Sovacool, B., Aall, C., Nilsson, M., Barbier, C., Herrmann, A., Sauerborn, R. (2019). It starts at home? Climate policies targeting household consumption and behavioral decisions are key to low carbon futures. *Energy Research and Social Science*, 52, 144–158.

Fägerlind I., L. Saha (1983). *Educational and National Development: A Comparative Perspective*. Oxford: Pergamon.

Georgeson, L. and Maslin, M. (2019). Estimating the scale of the US green economy within the global context. *Palgrave Communications*, 5(1), 136.

Jucker, R. and Mathar, R. (eds.) (2015). *Schooling for Sustainable Development in Europe*. Berlin: Springer International Publishing, Cham.

Mróz, A. (2018). *Nauczyciel wobec koncepcji zrównoważonego rozwoju w edukacji*. Kraków: Impuls.

The Global Education Project's website. https://edukacjaglobalna.ore.edu.pl/ (access: 2.12.2020).

The General Assembly of the Polish Academy of Sciences "Climate change: the official stance of the Polish Academy of Sciences" (2019). http://www.planetaziemia.pan.pl/GRAF_aktual/Stan_ZO-PAN.pdf (access: 11.11.2020).

The General Assembly of the Polish Academy of Sciences "Stance on the climate change, global warming and their alarming consequences" (2007). http://www.planetaziemia.pan.pl/GRAF_aktual/Stan_ZO-PAN.pdf (access: 11.11.2020).

The Ministry of National Education and Youth's ESD website. https://www.education.gouv.fr/l-education-au-developpement-durable-7136 (access: 3.12.2020).

The New Zealand Curriculum On-line. https://nzcurriculum.tki.org.nz/Curriculum-resources/Education-for-sustainability/EfS-in-schools#collapsible3 (access: 3.12.2020).

The New Zealand Qualification Authority. https://www.nzqa.govt.nz/ncea/subjects/education-for-sustainability/levels/ (access: 3.12.2020).

The New Zealand's Ministry for the Environment. https://www.mfe.govt.nz/publications/about-us/environmental-sustainability-highlights-new-zealand (access: 1.12.2020).

The official portal for education professionals Éduscol. https://eduscol.education.fr/1118/qu-est-ce-que-l-education-au-developpement-durable#lien2 (access: 3.12.2020).

The Poland's Ministry of Education and Science's LMS. https://epodreczniki.pl/szukaj?query=zr%C3%B3wnowa%C5%BCony+rozw%C3%B3j (access: 2.12.2020).

The Poland's Ministry of Education's ESD website. https://www.gov.pl/web/edukacja/tresci-z-zakresu-edukacji-o-zrownowazonym-rozwoju (access: 7.12.2020).

The Poland's Ministry of Education's response to the Ombudsman's inquiry. https://www.rpo.gov.pl/sites/default/files/Odpowied%C5%BA%20MEN%20ws%20edukacji%20klimatyczne-j%2C%2024.01.2020.pdf (access: 7.12.2020).

The Poland's Ministry of Environment's ESD website. https://nauczyciele.mos.gov.pl/index.php?mnu=92 (access: 2.12.2020).

The Science on Climate's website. https://naukaoklimacie.pl/aktualnosci/klimatyczny-galimatias-na-stronie-men-414 (access: 2.12.2020).

UN (2015). Sustainable Development Goals. New York: UN.

UNESCO (2006). Framework for the UN DESD international implementation scheme. Paris: UNESCO.

UNESCO (2012). ESD. Building a better fairer world for the 21st century.

UNESCO (2017). Textbooks for sustainable development-a guide to embedding. New Delhi: UNESCO.

UNESCO (2019). Educational content up close. Examining the learning dimensions of Education for Sustainable Development and Global Citizenship Education. Paris: UNESCO.

UNESCO (2020a). Education for Sustainable Development: Partners in Action. Global Action Programme (GAP) Key Partners' Report (2015–2019). Paris: UNESCO.
UNESCO (2020b). Education for Sustainable Development. A roadmap. Paris: UNESCO.
UNESCO (2020c). Integrating Action for Climate Empowerment into Nationally Determined Contributions. A short guide for countries. Paris: UNESCO.
Wals, A.E.J., and Kieft, G. (2010). Education for sustainable development: research overview. *Sida Review*, 13.
World Commission on Environment and Development (1987). Our common future. Oxford: Oxford University Press.

Abstract

"How were we supposed to know?" – the problem of embedding education for sustainable development in the learning process. Examples of New Zealand, France and Poland

There is a broad scientific consensus that climate change has the potential to significantly transform the natural environment. If correct, this will have dire socio-economic consequences. This topic, together with the closely related issues of the rate, scale, direction, and means of achieving economic development, is studied under the rubric of sustainable development (SD). We are now confronted with having to thoroughly transform our lifestyle (Druckman, 2016; Dubois et al., 2019). In view of this fact, it seems shortsighted that primary and secondary education in Poland lacks a compulsory, separate subject dedicated to the causes, consequences, and adaptive measures required in these new circumstances. The country has yet to produce a textbook on the subject. This paper examines and compares SD education in secondary schools in Poland, France and New Zealand. These three countries are analyzed in terms of their efforts to build social awareness of the ongoing and impending environmental and socio-economic transformations through the education system. France and New Zealand have made substantial progress, Poland, however, has fallen far behind in implementing ESD.

Keywords: sustainability, education, climate change, teaching curricula

Equal access to education as an aspect to serve Mexico's vulnerable population by 2020

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1. Introduction

Creating an egalitarian society is an unprecedented challenge that the government of Mexico must take on to seek the inclusion of all sectors of the population. Reducing existing high levels of inequality and poverty means providing employment opportunities that enable people to raise the quality of life individually and collectively. In basic education it is of particular relevance to offer an access, participation, permanence to all students, assuming their cultural processes in a respectful way.

Governance is therefore visualized as the joint participation of the different sectors involved in the educational process in order to establish the basic mechanisms of management and regulation, which respond effectively and efficiently to the approach established in article Third of the Political Constitution of the United Mexican States, to offer a free and lay education.

The momentum also given through various international organizations is important, such as the United Nations (UN), whose 2030 Agenda formulated in 2015 is a guiding document containing 17 Sustainable Development Goals and 169 targets. The document is titled "Transforming Our World, Agenda 2030, for Sustainable Development".

The document is a guide for the 193 UN member countries to integrate their development plans by prioritizing actions to combat common problems that are recurrent in all societies such as poverty elimination, climate change, women's equality, environmental advocacy, healthy city design and education.

Similarly, Mexico is part of the Organization for Economic Co-operation and Development (OECD), made up of 35 countries, which promote policies to improve the economic and social well-being of the population, where national governments have to work together and share their experiences. For this reason, it participates in regular evaluation activities in education, through the International Student Assessment Program (PISA), in order to assess its progress.

The results obtained by the students in this evaluation leave the country poorly positioned, as they have usually taken the last places. This overshadowed landscape emanates from a whole range of limitations and deficiencies in the educational organization that provides daily care. The attention crisis has long had an impact on education, so the average schooling grade of 7.9 is low compared to those in OECD countries. Now with the COVID-19 health crisis, the negative impact on education will be greater because of the lack of sufficient technological infrastructure.

This study addresses the topic of education, whose 4th objective in the 2030 Agenda is "Quality Education that ensures equitable and quality inclusive education and promotes lifelong learning opportunities". This objective aims to ensure that education is compulsory, free and lay, equally including all children and young people in the country (ECLAC, 2018).

Providing an equal and inclusive educational service is one of the 10 goals set out in Goal 4 which is currently being challenged by the pandemic that hinders the accessibility of children because of the confinement measures taken to prevent mass contagion. The Secretariat of Public Education (SEP) implemented the "Learn at Home" program, through television, computer and the internet, home-accessible technological and digital means to continue teaching daily classes online in the 2020-2021 school year.

The objective of the work is to analyze the socioeconomic characteristics of the school-age population of basic education in Mexico and how it accesses the program "Learn at Home" through the technological means available to students, thus guaranteeing its inclusion in the school year that takes place.

Serving the population living in marginalized areas is a priority now, by providing basic services and strengthening technological infrastructure to reduce the digital division that increases inequality in access to education, which is a necessity that must be addressed in the face of the inadequacy and inefficiency; therefore, to ensure access to the educational service, emphasis must be placed on rural and indigenous areas, so that it can reduce the gap between the country and the city (Fernández et al., 2020).

The fact that not the entire national territory has the same basic and connectivity services, which allow accessibility to the educational service equally and efficiently, causes tension and uncertainty to society and parents, especially in marginalized regions and municipalities because students are unable to access daily classes, due to the lack of electricity, television, computer or internet signal (UNAM, 2020).

2. Theoretical aspects of attention to equal education

It is categorical that educational activity would not make sense if it were not for the strategic objectives that it must meet: to provide citizens with solid academic training and useful knowledge that can be applied in their

daily lives as well as the strengthening of a number of skills, values and attitudes, all based on the principles of democracy, justice and freedom, which promote harmonious development in the individual and the society, with humanistic and technological scientific capacities, so that they can participate in the transformation and formation of a country and a more competitive and equal state.

In Mexico, it is the state that has the obligation and duty to provide the educational service and does so through the Secretariat of Public Education, responsible for providing society with the plans and school programs, teacher textbooks and the administration of school services. It generates educational access according to the needs of the population, promotes equal access, eliminates administrative barriers that promote inequality and develops culture that eliminates prejudice with respect to certain groups.

In the 2030 Agenda, the criteria for inclusion and equal access to education are considered for vulnerable people, such as women, older adults, people with disabilities and indigenous people who historically lagged behind, which has gradually been compensated through policies targeting these population groups. Today, basic education tuition is gender balanced as 49% of students are women and 51% are men (INEGI, 2017).

Economic accessibility

Education must be available to all people, and they cannot, for economic reasons, be excluded from this right. The principle of gratuitousness requires that no charge be made by the state in order to access the service. Following Uprimny in Ronconi (2017), it is possible to establish three conceptions of gratuitousness:

a) The minimalist conception, which states that the gratuitousness of education implies that only the costs of tuition and academic rights must be exempted from payment.
b) The intermediate conception, which states that, in addition to the above costs, the gratuitousness of education implies that a state should subsidize indirect costs, such as uniforms, books and transport.
c) A third, more robust conception states that gratuitousness must cover compensatory expenses, i.e. that the state would have to subsidize the cost of opportunity incurred by the family in sending a child to school.

In this sense, free of charge implies not only that children attending school do not pay any money as a fee or school insurance, but also that the state must have all those measures in place to make education possible (Ronconi, 2017).

To understand the "Learn at Home" Program better, the concept of Distance Education is defined, supported by the "Observatory of Technological Innovation" the publishing body of the Technological of Higher Studies of Monterrey (Ibañes, 2020), which reads as follows.

Distance education

According to CONAPO (2010), it is a multidimensional and structural phenomenon ultimately caused by the economic production model expressed in the unequal distribution of progress, in the productive structure and in the exclusion of various social groups, both from the process and from the benefits of national development.

Marginalization

According to CONAPO (2010), it is a multidimensional and structural phenomenon ultimately caused by the economic production model expressed in the unequal distribution of progress, in the productive structure and in the exclusion of various social groups, both from the process and from the benefits of national development.

Educational vulnerability

It refers to those individuals who experience a number of marked difficulties throughout their school career that prevent them from taking advantage of the curriculum and teachings within the classroom (Diaz, Pinto, 2017).

Inclusion

It is the recognition of the social rights of the population that is based mainly on articles 2nd, 3rd, 4th, 5th and 123 constitutional which point out that non-discrimination, education, health, food, housing, a healthy environment, work and social security, are rights guaranteed to all Mexicans (Nemer, 2015).

3. Methodology

The methodology used for development this work was contemplated in the following stages: regionalization; collection of population data from various institutions working on current and reference data such as INEGI and the UN Department of Economic and Social Studies, the National Institute for Educational Assessment (INEE, 2019), the National Population Council (CONAPO) and the National Poverty Assessment Council (CONEVAL), among others.

A mixed methodological design was structured, considering the ethnographic method which proposes access to educational equality, the geographical method that supports the visualization of the distribution of digital media used by the educational program "Learn at Home" and the phenomenological method to know the implications of program application for parents and society.

The analysis criteria used were the description of the national territory, of the total existing population, of technological infrastructure in Mexican households; connectivity across the country to relate to learning. Subsequently, the academic life of the schools is compared with the distance classes and their implications, to end with the analysis of discrepancies taking as a guide the provisions of the Political Constitution of Mexico, the 2030 Agenda and what the Federal Government is doing to serve the school population in this pandemic situation.

Results

Description

The Mexican Republic is part of a community of countries that share common geography. However, it is distinguished by physical and human characteristics that show the reality of the environment: it covers the area of 1,964,375 km^2 (INEGI, 2020), with a total population of 136,528,571 inhabitants (UN, 2020), and a density of 69.5 inhabitants per km^2.

The economically active population is 57,328,364 inhabitants (41.9%); the economically inactive population is 28%; people start working when they are 15 and older people who still work represent the 70%; the population under the age of 15 is 40,743,943 and accounts for 30% of the total. In terms of marginalization, the age group of young people aged 12 to 29 accounts for 12% and extreme poverty 2% in total are 19,000,000 young people who lack the essentials to meet their basic needs.

There are 283 (11%) municipalities with a high level of marginalization located in 13 states of the Mexican republic, belonging to the socioeconomic area of the south, where approximately 26 million inhabitants live in conditions of marginalization and poverty, which equates to 6.5 million households that do not have basic services such as drinking water, electrical power or adequate access roads. Such states are Warrior, Oaxaca, Chiapas, Veracruz, Puebla and Michoacán, which consist of the population with the highest margination rate (*La Jornada*, 2020).

Of the 30% of the population under the age of 15, 25,447,467 students are served in basic education at the Preschool, Primary and Secondary levels, including physical education and cultural promotion, with 1,219,862 teachers in 226,188 schools established in all regions of the country: the student/teacher ratio is at the rate of 20.8 pupils per teacher; the student/school ratio is 112.5 pupils per school; proportions on average show that they are within the parameters set in care (INEE, 2019).

The "Learn at Home" Program was designed to cater for children with distance classes through open tv, radio or mail channels and the materials used are usually physical: notebooks, pens, colors, USB sticks, CDs, among others. Many educational materials and lessons are sent by mail and updated (Ibañez, 2020).

Comparison

Attending school was a tradition and custom: students took classes, under-resourced children got their meals and the school building was a center to attend other types of social activities (polling stations and vaccination centres were often located in a school building). These activities have always been present throughout the national territory, so the school has always been the center and axis of a society, especially in marginalized regions and areas.

The sudden metamorphosis of the educational service, forced by the confinement generated by COVID-19, has become a challenge to all, students, teachers and administrative staff involved in the sector, since it was thought that everyone had experience in the use of technologies. Therefore, the curriculum was to be followed at home so as not to miss the school year.

And so we have to enroll 25,447,467 basic education students in 226,188 schools in the 2018-2019 school year to receive their classes on television, radio, mail, online, supported by platforms such as Classroom, Microsoft Teams and the new Mexican school, where students and teachers can consult and download the classes and PDF versions of Learn at Home II, school calendars, respective programming and guidance from free formatting programs and textbooks (Wong, 2020).

As 11% of households do not have any services and are cared for by CONAFE, it delivered school packages containing infographics that guide parents and educational figures on home learning and accompaniment required by students to more than 22 thousand high-marginalization locations (*La Jornada*, 2020).

Online education causes cultural clash as in most households television is used for entertainment in the evening; now it is used as an educational tool (albeit boring and annoying) in the morning.

Educational gap is a kind way of saying that rich children will often be able to get a better education than poor children. This was a problem even before the coronavirus forced schools to close in March. The pandemic could exacerbate what was already an acute problem and television and radio cannot solve the underlying disparities.

Analysis of discrepancies

The Political Constitution of the United Mexican States, in Article 3, states that every individual has the right to receive education, which the State must provide, harmoniously developing the faculties of the human being, fostering love of the homeland, respect for human rights and awareness of international solidarity in independence and justice (Chamber of Deputies, 2012).

Therefore, the State must ensure equal access to education for all children who are of school age (3 to 15 years), without excluding them because of their social status, race or economic factor. In this regard, significant progress has

been made, although the growing population expresses dissatisfaction with not caring for all school-age children.

Social exclusion resulting from marginalization creates problems arising from the current economic structure of consumption. Inequality persists due to poverty, ethnicity, and language that curb advances in education. As it is coupled with little or no training of teaching staff in technologies, it creates a wider digital divide. At this time, other gaps such as socioeconomic, gender and technological that express inequality are added to the digital divide. This is presented on the map of the country, showing the connectivity in all states (Figure 1).



Figure 1. States with good or poor connectivity in Mexico

Source: information taken from CEO, based on INEGI. https://elceo.com/tecnologia/desigualdad-conectividad-negocio-att-telcel/

On this map you can see that the states with the poorest connectivity are the States of Guerrero, Oaxaca, and Chiapas, in contrast to the Northern State and Yucatan Peninsula, which shows that marginalized population lives in the

south of the country. It causes high emigration of unqualified labor, and many personal needs have to be met.

And in the face of this inquisitory picture, education is not exempt from it. The most palpable thing now is that COVID-19 has exposed social inequalities exacerbated by an economic system aligned to market swings: jobs without social security, a growing informal sector, an inefficient and disvalued health system.

It should be noted that the pandemic itself is equal because it does not discriminate. It places us on an equal level of contagion, the possibility of losing loved ones and living in a world of constant threat; however, it reveals the speed of radical inequality that includes racial and gender supremacist ideologies, as well as capitalist exploitation within pandemic zones.

Finally, the closure of schools carries high social and economic costs for people in all communities. Its impact will be particularly severe for the most vulnerable and marginalized children and their families, because of the disparities already existing within the education system, but also in other aspects of their daily lives.

4. Conclusions

Having analyzed equal access to basic education for children, the following conclusions are drawn:

- Mexico's Education System is conventional. It is based on attending schools, so the pandemic showed the deficit of the structures that provide the service.
- The closure of schools is notorious, since apart from educating students, they are used for other activities such as feeding the population with few resources and being a center of organization and social coexistence.
- The most devastating effect of COVID-19 on the country's education will be the increase in the dropout rate, which will be especially true for those who lack the digital, economic, and school resources to deal with the crisis: indigenous people, children of migrant day laborers and young people in extreme poverty. In all these cases, women are at a greater risk than men.
- The pandemic has exposed many adaptive problems: teachers experience difficulties with using platforms, are not able to explain the documents they write, which results in boredom of the students.
- The effectiveness of learning is uncertain, due to the rapid metamorphosis of education and the change of instruments used in this new pedagogy such as television, radio mail, computer, internet and other digital media available to students at home.
- Parents are not prepared for online learning at homeClosing schools makes it difficult to keep up with schoolwork, especially for students with limited resources.

Childcare gaps: in the absence of alternative options, working parents often leave children alone when schools close and this can lead to risky behaviors.

Bibliography

Backhoff, E.E. (2020). Education and Covid-19 in Mexico. Retrieved from: https://www.eluniversal.com.mx/opinion/eduardo-backhoff-escudero/educacion-y-covid-19-en-mexico-ii.

Castro, D.L.I. and Cano, G.R. (2013). Poverty and Vulnerability: risk factors in the educational process. *Educational Contexts, Journal of Education*. Retrieved from: https://publicaciones.unirioja.es/ojs/index.php/contextos/article/view/1290/1209.

CEO (2019). Technology. Retrieved from: https://elceo.com/tecnologia/desigualdad-conectividad-negocio-att-telcel/.

Chamber of Deputies (2012). Draft opinion adding various provisions of the Politic Constitution of the United States Mexicans in Education Materia. Parliamentary Gazette, No. 3666_VIII.

CONAPO (2010). www.conapo.gob.mx/en/CONAPO/2010.

CONEVAL (2018). National Social Policy Assessment Council, Normative Document. Retrieved from: https://www.coneval.org.mx/Paginas/principal.aspx.

Diaz, L.C. and Pinto, L.M.L. (2017). Educational vulnerability: a study from the critical partner paradigm. Revisit Praxis Educative. Argentina: Universidad Nacional de la Pampa. Retrieved from: https://www.redalyc.org/jatsRepo/1531/153151864005/html/index.html#:~:text=Resumen%3A%20El%20concepto%20de%20Vulnerabilidad,dentro%20del%20aula%20de%20clase.

ECLAC (2018). 2030 Agenda and the Sustainable Development Goals, An Opportunity for Latin America and the Caribbean. Retrieved from: https://repositorio.cepal.org/bitstream/handle/11362/40155/24/S1801141_es.pdf.

ENDUTIH, INEGI (2019). National Survey on the Availability and Use of Information Technologies in Homes, INEGI. Retrieved from: https://www.inegi.org.mx/programas/dutih/2019/.

Fermoso, E.P. (1994). *Theory of Education*. Mexico: Editorial Trillas. D.F.

Fernández, M.A., Herrera, L.N., Hernández, D., Nolasco, R., De la Rosa, R. (2020). Lessons from COVID-19 for the Mexican Educational System, Nexus. Retrieved from: https://educacion.nexos.com.mx/?p=2228.

Heredia, R.B. (2020). The Mexican Education System in the face of the COVID-19 crisis. Retrieved from: From Another Angle. https://www.elfinanciero.com.mx/opinion/blanca-heredia/el-sistema-educativo-mexicano-frente-a-la-crisis-del-covid-19.

Ibañez, F. (2020). Online, Virtual, Remote and Remote Emergency Education, what are its characteristics and differences? Observatory on Educational Innovation. Monterrey Technology. Retrieved from: https://observatorio.tec.mx/edu-news/diferencias-educacion-online-virtual-a-distancia-remota.

INEE (2019). Compulsory Education in Mexico, Report 2019. National Institute for Educational Assessment. Retrieved from: https://www.inee.edu.mx/medios/informe2019/stage_02/index.html.

INEGI (2017). Men and Women in Mexico. Retrieved from: http://cedoc.inmujeres.gob.mx/documentos_download/MHM_2017.pdf.

Jaimes, J.C. (2020). The Education System in Mexico vs Covid-19. Retrieved from: https://www.elsoldecuernavaca.com.mx/cultura/el-sistema-educativo-en-mexico-vs-covid-19-5132782.html.

La Jornada. (2020) Delivered Conafe Distance Education Material to 300,000 Students. Retrieved from: https://www.jornada.com.mx/ultimas/sociedad/2020/04/26/entrego-conafe-material-de-educacion-a-distancia-a-300-mil-alumnos-8071.html.

Mayagoitia, P.E.A., Talamantes, E.M.C., Vega, V.S. (2016). School Vulnerability in Higher Middle Education. Retrieved from: http://altamira.cut.edu.mx/assets/archivos/articulos/58e30fd13c18e-5.VULNERABILIDAD%20ESCOLAR%20EN%20EDUCACIO%CC%81N%20MEDIA%20SUPERIOR.pdf.

Monreal, C. (2020). Educational Inequality in COVID-19 Times, Excelsior. Retrieved from: https://www.excelsior.com.mx/opinion/opinion-del-experto-nacional/desigualdad-educativa-en-tiempos-de-covid-19/1400420.

Nemer, E. (2015). Poverty and Social Inequality. Lecture presented at the Mexican Society of Geography and Statistics in the State of Mexico, on June 2, 2015.

OECD (2012). OECD Indicators Education Overview 2012. Retrieved from: https://www.mecd.gob.es/dctm/inee/internacional/panorama2012.pdf?documentId=0901e72b81415d28.

OECD (2020). Education at a Glance 2020, OECD Indicators. Retrieved from: https://www.oecd-ilibrary.org/education/education-at-a-glance-2020_69096873-en.

Olmos, C.A. (2018). The Achievements of Educational Reform. In: *Enrique Peña Nieto, The Architect of Postmodern Mexico*. Mexico: Ed. Knowledge and Knowledge, XXI Century.

Ornelas, C. (2020). Learn at home II the lesser evil. Always, presence in Mexico. Retrieved from: http://www.siempre.mx/2020/08/aprende-en-casa-ii-el-mal-menor/.

Pérez, P.J. and Merino, M. (2010). Vulnerability Definition. Retrieved from: https://definicion.de/vulnerabilidad/.

Rocha, M.M. (2004). Modelagem da Dispersão de Vetores Biológicos com emprego da Estatística Espacial. Dissertação de Mestrado. Rio de Janeiro: Instituto Militar de Engenharia-IME.

Ronconi, L. (2017). Access to education from an egalitarian perspective: the influence of international human rights law. UNAM Legal Research Magazine 2018. Retrieved from: http://www.scielo.org.mx/pdf/amdi/v18/1870-4654-amdi-18-191.pdf.

Tourdert, D. (2013). The digital divide in the contexts of socioterritorial marginalization in Mexican localities: exploration and discussion. *Revista Comunicación y Sociedad*, University of Guadalajara. Retrieved from: file:///Users/aolmc/Documents/11.%20Vulnerabilidad%20Educativa/La_brecha_digital_en_los_contextos_de_marginacion_.pdf.

UN (2017). 30 Years of Poverty Reduction. Department of Eco-Economic and Social Affairs, Bulletin. Retrieved from: https://www.un.org/development/desa/es/news/social/international-day-address-poverty.html.

UN (2020). Total Population, UN Department of Economic and Social Affairs. Retrieved from: https://www.un.org/development/desa/es/news/population/world-population-prospects-2019.html.

UNAM (2020). Lag and inequality will be the cost of COVID-19 in education. Retrieved from: https://www.msn.com/es-mx/noticias/mexico/rezago-y-desigualdad-ser%C3%A1-el-costo-de-la-covid-19-en-educaci%C3%B3n/ar-BB18j1BE.

Wikipedia (2020). Retrieved from: https://es.wikipedia.org/wiki/Aprende_en_casa.

Wong, A.P (2020). SEP launches portal to strengthen student learning. Read in https://www.milenio.com/politica/sep-lanza-portal-contenido-aprende-casa-ii.

Abstract

Equal access to education as an aspect to serve Mexico's vulnerable population by 2020

Equal access to education is of relevance to serving Mexico's vulnerable population by 2020 and without a doubt, they are premises that need to be implemented to achieve sustainable development. However, the educational diagnosis is a shadow rather than the COVID-19 health crisis, which is now looming and will have great repercussions in academic training in the short, medium and long term. The objective of the work is to analyze the socioeconomic characteristics of the school-age population of basic education in Mexico and how it accesses the program "Learn at Home", through the technological means available to continue their studies in the school year 2020-2021, supported by the digital means they have at home. The methodology for conducting the study has been built by combining the geographical, ethnographic, and phenomenological method, which helps to understand human behavior towards this new national educational normality. As a result, data and mapping on population marginalization were obtained at the national level, as well as the data related to health services in basic education, taking into account inclusion and equity under the current situation, which becomes more vulnerable due to COVID-19.

Keywords: equal access, education, vulnerability, marginalization

Do SDGs have a transformative power? 2020 Human Development Report *The next frontier. Human development and the Anthropocene* as a new perspective to view Sustainable Development Goals

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Introduction

In 2015, 193 states agreed to implement the 17 United Nation Sustainable Development Goals (SDGs) by 2030. 169 targets and 232 indicators to measure the progress against targets for each of the 17 goals were set. SDGs were thought as continuation and enrichment of their predecessor, the 2000–2015 Millennium Development Goals (MDGs). Whereas the latter were formulated in an effort to coordinate international cooperation for development programs financed by developed countries and international organizations and implemented across the Global South less developed countries, the SDGs 2030 Agenda was conceived as universal, concerning both the developed and the less-developed world, although in the case of some of the goals the need of assistance to less developed countries was made clear.

The 2030 Agenda can be considered as a success in terms of universal consensus on the common path to follow during the 15 years' period, especially if we look closer at political negotiations and discussions that had led to its final shape (Langford, 2016). However, since 2015 SDGs have been subject to critiques. Academic studies representing a wide array of disciplines point their weaknesses and inconsistencies. The changing global context, with COVID-19 pandemics reinforces some of the critical voices, bringing serious questions not only about the feasibility of reaching the 2030 goals but also about their overall idea.

The 2020 Human Development Report published in December under a meaningful title *The next frontier. Human development and the Anthropocene* sets new challenges to the thirty years old concept of human development and its measures. Although it refers to SDGs on the margin only, it centres attention on the changing global context, setting a new nature-based human development agenda.

The text aims at presenting the close affinity between the SDGs critiques and requirements of the new context described in the 2020 Human Development Report, showing the main post-pandemic SDGs challenges.

SDGs critiques

For the sake of summarizing the main directions of SDGs critiques I will divide them into three groups: the first one contains voices questioning the SDGs core ideas and the ideology that underpins them, as well as the ones discussing SDGs' internal contradictions. The second one represents authors referring to problems of SDGs measurements and their practical, effective application, and the third one draws on recent global changes and looks critically at SDGs within their context.

In the first case, we deal with a longstanding intellectual trend of critical discourse on the concept of development that has made its presence within anthropology, philosophy, geography, political ecology, political sciences, among others, since the 1990s. Some of its proponents saw "development" and accompanying "development industry" as mechanism of domination of the "developed" countries (former colonial powers) over the "underdeveloped ones" (former colonies) (Escobar, 1995). Some pointed to intellectual consequences of viewing the world in terms of the division in its "developed" part, representing the desired aspirations and the "underdeveloped" one, synonymous with unwanted backwardness, justifying the "one solution for all" policies (Rist, 1997). Over time, environmentally based critique of development has grown (Sachs, 1991), while disastrous consequences of "development – oriented" investments proliferated all over the world. Grassroots organizations and social movements defending people's territories and lifestyles against state and capital led "development projects" maintained an interesting dialogue with the critical intellectuals.

Although the concept of 'sustainable development' (SD) emerged in reaction to "development's" constraints, particularly the environmental ones, after its meaning shifted from strong sustainability expressed in the Brundtland report in terms of intergenerational global responsibility for the world' resources to a much weaker one, represented by a vague idea of balance of economic, social and environmental outcomes of 'development', SD was subject to criticism as unclear, fuzzy, or even oxymoronic (development based on the idea of growth cannot be 'sustainable') and perverse[1]. Naming the 2015–2030 global goals with such a contested term has been seen as problematic, especially that the corresponding document does not define sustainability in a clear way. "SD can mean anything to anybody. Ergo, are we to take it that the

[1] For the summary of 'sustainable development' critiques see my previous text: Lisocka-Jaegermann 2015, 2017 and 2018.

SDGs are also something that will mean simultaneously anything and nothing, a warm fuzzy term that holds no real critical content, a greenwashing of yet another international set of agendas? Is choosing SDGs a wink to expect a lot more of the same vagueness and buzzwords as was generated from SD itself?" (Sultana, 2018, p. 188). Another geographer states "The SDG targets are rife with poorly defined but widely used terms such as sustainable, resilience, and modern. The goal of being 'sustainable' is mentioned in 10 of the 17 goals without clear definition, and resilient is a goal in 2 of them. We have been debating the definition of sustainability for decades, it has become widely used, and yet there is still no consensus on how to measure it" (Liverman, 2018).

Identifying SDGs with SD means that they are based on "business-as usual" economic principles, or putting it in a more radical way: "they lock the global development agenda around a failing economic model" (Hickel, 2015). Feminist critiques point as well at "the SDGs' neglect of (and failure to take a transformational approach to) economic and social structures; the SDGs' promotion of traditional economic models and prioritization of growth over other possible models; and the SDGs' overall failure to address structural power relations." (Consortium…, 2017, p. 3). Similar opinions expressed by other scholars question the transformative value of SDGs. The issue of power relation is being raised by human rights proponents and development scholars. "International development, aid monies, and all development goals are effectively about power. Thus, deconstructing and demonstrating the ways power relations operate, the kinds of powers that exist, and asking questions of what, who, why, and where, become critical in assessing these large international interventions that impact peoples and places" claims Farhana Sultana (2018) taking part in a discussion on geographers' involvement in research on SDGs and in their critique.

Sticking to the economic growth in terms of production and consumption[2] while calling for environmental actions[3] is seen as a major internal contradiction of SDGs. There are several examples of studies verifying it, like Randers and al. (2019) building a model showing that economic growth implies higher levels of CO_2 emissions, or Jason Hickel (2019) demonstrating that the desired growth rates are impossible to reach within the current economic-technological model.

In comparison to Millennium Development Goals SDGs seem to address environmental issues seriously: beside the goals directly referring to environmental sustainability, already mentioned, there are environmental concerns

[2] Goal 8: promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; goal 9: build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.

[3] Goals 13-15: take urgent action to combat climate change and its impacts (taking note of agreements made by the UNFCCC forum); conserve and sustainably use the oceans, seas, and marine resources for sustainable development; protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss.

within other goals. However, some authors see it as an excessive fragmentation of environmental challenges subdued to the social and economic goals. That fragmentation goes against holistic, systemic approaches, claimed by specialist in systems theory. "We suggest that humanity embraces four misconceptions that hold us back from taking the right path. Firstly, we suffer under the illusion that human wellbeing is defined at the level of the individual. Secondly, we indulge in the Kuznets illusion that economic growth can deliver social and environmental sustainability. Thirdly, we persist in the empirical illusion that the Earth system is a linear construct, best understood through empirical philosophy and dominated by silo thinking, in ignorance of trade-offs and the importance of interconnections. We proselytize an approach centered around the substitution of natural capital with economic capital. Fourthly, we continue to optimize for ourselves rather than for the Earth system. And our sustainability policies, dominated by the dogma of growth-based sustainable development, only build on these misconceptions" states Keith Skene (2020), concluding: "Only by recognizing that the Earth system is above and beyond everything else, can we begin to understand our place within the Biosphere, and the essentiality of reintegration. Here, processes, rather than structures, dominate. We must embrace an emergent Earth system that can self-assemble and self-organize as it always has done. Furthermore, individualism and the silo mentality must be replaced with socio-ecological philosophy, where landscape and humanity can interact at local levels, ensuring appropriate cultural diversity within local environmental contexts. A pluriverse of ecosystems demands a pluriverse of societal organization. There is no end point, but rather our destination is a journey, based around proper functioning of the natural world, where embeddedness and resonance are the foci" (Skene, 2020).

The long quote cited above sums up many of the worries that repeat themselves in the detailed analysis of particular goals feasibility that can be found in recent bibliography.

Critical voices belonging to the second groups of SDGs criticism focus on the too numerous list of goals and targets, seen as too complex to be accepted by the public and too fragmented to drive policy effectively (Langford, 2016). Potential problems with goals' progress reporting and monitoring and an exorbitant number of data needed for that sake are also mentioned as well as difficulties with proper data collection in countries that need them most.

The third groups of critiques formulated along 2020, in the midst of COVID-19 pandemic address those problems. Already before the pandemic, at least two groups of experts worked on redistribution of 17 goals and the corresponding tasks into more compact clusters. Sustainable Development Solutions Network (SDSN) grouped the 17 goals in 6 "transformations". These are: education, gender and inequality; health, well-being and demography; energy decarbonization and sustainable industry; sustainable food, land, water and oceans; sustainable cities and communities; and digital revolution for sustainable development.

In 2020 there is an agreement that governments should focus on a selected group of goals as economic constraints do not allow to work on all of them. Naidoo and Fisher, among others, claim that we should decouple the SDGs from economic-growth targets (Naidoo, Fischer, 2020). Growth is impossible to be achieved soon anyway, but what is even more important is that its results are not equally shared and can easily lead to the contradiction of other, more important social and environmental goals.

Radical changes are also suggested in the 2020 *Report of the Special Rapporteur on extreme poverty and human rights*, prepared by Philip Alston for the Human Rights Council. "Supporters of the SDGs should acknowledge that there is a deep deficit of political motivation underlying the current malaise in which key goals such as poverty eradication, economic inequality, gender inequality, and climate change are very far from being achieved. To avoid sleepwalking towards assured failure while pumping out endless bland reports, new strategies, genuine mobilization, empowerment, and accountability are needed. Recalibrating the SDG framework itself in response to fundamentally changed circumstances is an urgent first step" (Alston, 2020, p. 19).

2020 Human Development Report and a new context for Sustainable Development Goals

The first Human Development Report, was published in 1990. For 30 years, the concept of human development – a response to reductionist visions of development seen primarily in economic terms – and the way of measuring it, have been discussed every 12 months in yearly reports. Human Development Index measures a nation's health, education, and standards of living, but new dimensions were being added to it, reflected in such measures as Inequality-adjusted HDI, the Gender Development Index, the Gender Inequality Index, the Multidimensional Poverty Index.

The 2020 Reports shows the next frontier for human development: it will require working with and not against nature, while transforming social norms, values, government and financial incentives. The term "Anthropocene – the age of humans" is used in the document to sum up present-day challenges. The report's first part is devoted entirely to the presentation of analytical, empirical and policy perspectives on how human development relates to the concept of and debates around the Anthropocene. The second part deals with implications for action, discussing three key mechanisms for change: social norms, incentives and nature-based human development. The third part talks about Anthropocene's implications for measuring human development, introducing planetary – pressure adjustment of the HDI, consisting in two additional elements: a country's carbon dioxide emissions and its material footprint. This kind of metrics changes the global development panorama responding to the new challenges: "The transformational changes required to ease planetary pressures and

redress social imbalances call for another reorientation of goals and choices like the one that the HDI encouraged 30 years ago (UNDP, 2020, p. 227)[4].

Many of the statements present in the document resemble opinions of "development", SD and SDGs most radical critiques cited above. It discusses the role of power relations: "We must critically examine the crucible of human values and institutions – specifically the way power is distributed and wielded – to accelerate implementation of the 2030 Agenda for Sustainable Development for people and planet" (UNDP, 2020, p. 6). It also talks about the need of application of systemic approach instead of simple problem-solving one: "We must reorient our approach from solving discrete siloes problems to navigating multidimensional, interconnected and increasingly universal predicaments." It questions as well (although rather timidly) mainstream economic patterns: "Importantly, many of the processes and systems of today need to change: processes that overexploit and over emit, processes that benefit only the few, and the root causes and driving forces of these processes – such as consumerism, business models of unlimited economic growth and the displacement of impacts and dependencies across geographies and generations" (UNDP, 2020, p. 37).

The diagnosis offered in the first chapter sounds alarming. "We are destabilizing the planetary systems we rely on for survival"; "the strain on our planet mirrors that in societies"; "these imbalances reinforce each other, amplifying the challenges" (UNDP, 2020, p. 2). The action seen as desirable implies deep changes: "We need a just transformation in the way we live, work and cooperate"; "new social norms, improved incentives and working with – not against – nature can take us there" (UNDP, 2020). The claim of putting the Planet in the center appears throughout the document: "Now, in the context of the Anthropocene, it is essential to do away with stark distinctions between people and planet. Earth system approaches increasingly point to our interconnectedness as socio- ecological systems, a notion highly relevant to the Anthropocene" (UNDP, 2020, p. 8).

Transformation and transformational change are two key words that can be found in all the chapters of the document: "We must reimagine the human development journey and leverage the human development approach to support transformational change." (UNDP, 2020, p. 20). "Transformations would be the means to redesign systems to have justice and sustainability at their core rather than to gradually adjust systems to be less bad." (UNDP, 2020, p. 37).

The text provides an explanation of the concepts meaning: "Transformation" or "transformational change" can be defined by contrasting it with adaptation. Adaptation is about adjusting responses to changing external drivers and internal processes (of, for example, a business, community, city or economy) in order to remain on the current development path. An example of this is when farmers switch to more drought-tolerant crops or when insurance

[4] All the quotes in the last part of the text refer to 2020 Human Development Report unless stated otherwise.

companies raise their premiums to adapt to climate change. Transformation, on the other hand, involves creating a fundamentally new system when ecological, economic or social conditions make continuing the existing system untenable. This could challenge the behaviours, business models and mindsets that generated dangerous planetary change in the first place. As such, transformations are characterized by radical changes in everything from power and resource flows to roles and routines. Shifts must take place at different levels of society, from practices and behaviours to rules and regulations to values and worldviews. The research also emphasizes that to succeed, transformations need to change the relationships both among humans and between humans and nature" (UNDP, 2020, p. 272, endnote 95 to chapter I).

According to the report's authors enhancing human agency, changing social norms and creating incentives can lead us to transformation along with a new generation of nature-based solutions. "They can protect, sustainably manage and restore ecosystems, simultaneously promoting wellbeing and mitigating biosphere integrity loss. They embrace equity, innovation and stewardship of nature, the three elements of the compass for empowerment". There is much room devoted to indigenous knowledge and indigenous population, vernacular, nature-based livelihoods, as well as a claim for locally based transformative scenarios.

Final remarks

Considering the 2020 Report's content: do Sustainable Development Goals have adequate transformative power? They were conceived rather within the perspective of adaptation and separate problems solving, in the context of prosperous economic growth and advancing globalization processes. Can they take us towards "fundamentally new systems" in the post COVID-19 Anthropocene reality?

Some of the authors represented in the report try to answer that question: "For the Sustainable Development Goals to be transformative, we must see them in their entirety as integral environmental, social and economic goals. They must be adapted to and consistent with the contexts in which they are being applied. Long-term sustainability is more than meeting quantitative targets; it requires reshaping the processes of development. Goals must be periodically reevaluated in light of new knowledge and development to ensure that they represent just and sustainable futures for all" (UNDP, 2020, p. 98). Can the SDGs fulfill those expectations? Attempts at their redesigning have already been mentioned in the text's second section. Or should we rather think of a novel global agenda, as Farhana Sultana suggests: "If we want emancipatory politics and transformation, we need to do something differently and develop new tools beyond the SDGs" (Sultana, 2018, p. 190). New proposals are emerging, some of them coming from Latin America as the one of Global Buen Vivir Objectives (Hidalgo-Capitán et al., 2018).

Bibliography

Alston, Ph. (2000). The parlous state of poverty eradication. Report of the Special Rapporteur on extreme poverty and human rights. Human Rights Council. www.ohchr.org › Documents › A_HRC_44_40_AUV.

Consortium on Gender, Gender, Security and Human Rights (2017). Feminist Critiques of the Sustainable Development Goals. Analysis and Bibliography. http://genderandsecurity.org/projects-resources/bibliographic-resources.

Escobar, A. (1995). *Encountering Development*. Princeton: Princeton University Press.

Hickel, J. (2015). Why the new sustainable development goals won't make the world a fairer place. *The Conversation*. Retrieved from: http://theconversation.com/why-the-new-sustainable-development-goals-wont-make-the-world-a-fairer-place-46374 (access: 25.05.2018).

Hickel, J. (2017). It will take 100 years for the world's poorest people to earn $ 1.25 a day. *The Guardian*, 30 March 2015. Retrieved from: https://www.theguardian.com/global-development-professionals-network/2015/mar/30/it-will-take-100-years-for-the-worlds-poorest-people-to-earn-125-a-day (access: 15.11.2020).

Hickel, J. (2019). The contradiction of the sustainable development goals: Growth versus ecology on a finite planet. *Sustainable Development*, 15. Doi.org/10.1002/sd.1947.

Hidalgo-Capitán, A.L., Cubillo-Guevara, A.P., García-Álvarez, S., Medina Carranco, N. (2018). Los objetivos del buen vivir a escala global. Una crítica de los objetivos del desarrollo sostenible y una propuesta alternativa transmoderna. Universidad Central del Ecuador, Huelva.

JULY (2020). https://www.nature.com/articles/d41586-020-01999-x.

Langford, M. (2016). Lost in Transformation? The Politics of the Sustainable Development Goals. *Ethics & International Affairs*, 30(2), 167–176.

Lisocka-Jaegermann, B. (2015). Sustainable Rural Development or (Sustainable) Rural Livelihoods? Strategies for the 21st Century in Peripheral Regions. En: *Barometr Regionalny*, 13, 1, 13–20.

Lisocka-Jaegermann, B. (2017) ?Del desarrollo sostenible por vulnerabilidad hacia la resiliencia? In: B. Lisocka-Jaegermann, Z. Piotrowska, K. Ząbecki (eds.), *La vulnerabilidad socioeconómica y ambiental en el contexto local y regional*. Warszawa: WGiSR UW, pp. 63–73.

Lisocka-Jaegermann B. (2018). Territorio, territorialidad y recursos en las estrategias locales de cambio alternativas: el caso de las áreas rurales andinas. In: F. Cebrián Abellán, F.J. Jover Martí, R.C. Lois González (eds.), *América Latina: últimas décadas: procesos y retos*, Ediciones de la Universidad de Castilla-La Mancha, pp. 1061–1070.

Liverman, D.M. (2018). Geographic perspectives on development goals: constructive engagements and critical perspectives on the MDGs and the SDGs. *Dialogues in Human Geography*, 8(2), 168–185.

Naidoo, R., Fisher, B. (2020). Reset Sustainable Development Goals for a pandemic world. *Nature*, 583, 198–201. Doi.org/10.1038/d41586-020-01999-x.

Randers, J., Rockström, J., Stoknes, P.-E., Goluke, U., Collste, D., Cornell, S.E., and Donges, J. (2019). Achieving the 17 Sustainable Development Goals within 9 planetary boundaries. *Global Sustainability*. Published online by Cambridge University Press 28 November 2019: https://www.cambridge.org/core/journals/global-sustainability/article/achieving-the-17-sustainable-development-goals-within-9-planetary-boundaries/5934F82F471B751168A0B2AE59AD0319.

Redclift, M. (2005). Sustainable development (1987-2005): an oxymoron comes of age. *Sustainable Development*, 13(4), 212–227.

Rist, G. (1997). *The History of Development: From Western Origins to Global Faith*. London and New York: Zed Books.
Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G., Woelm, F. (2020). *The Sustainable Development Goals and COVID-19. Sustainable Development Report 2020*. Cambridge: Cambridge University Press.
Sachs, W. (1991). Environment and Development: The Story of a Dangerous Liaison. *The Ecologist*, 21(6), 252–257.
Skene, K.R. (2020). No goal is an island: the implications of systems theory for the Sustainable Development Goals. *Environment, Development and Sustainability*.
Sultana, F. (2018). An(Other) geographical critique of development and SDGs. *Dialogues in Human Geography*, 8(2), 186–190.
UNDP (United Nations Development Programme) (2020). 2020 Human Development Report *The next frontier. Human development and the Anthropocene*.

Abstract

Do SDGs have a transformative power? 2020 Human Development Report *The next frontier. Human development and the Anthropocene* as a new perspective to view Sustainable Development Goals

The text aims at presenting the close affinity between the SDGs critiques and new global context's demands described in the 2020 Human Development Report, showing the main post-pandemic SDGs challenges. In order to act as a transformative mechanism SDGs have to be reinterpreted and adapted to the new situation, undergoing radical changes.

Keywords: SDGs, HDI, Anthropocene, nature-based development, transformative initiatives

Thousands of pages have already been written on sustainable development. However, the subject is still relevant. Processes occurring in the environment, especially the climate change, only emphasize the need for further research and discussion on the subject. In this monograph we return to the issue of understanding and implementing the idea of sustainable development in Poland and Latin America. We also join the discussion on sustainable urban development and governance. Finally, by presenting a few examples, we address the issue of the conflicting nature of sustainable development policies in some countries and regions. The book also introduces the reader to the issue of education on sustainable development.

This publication is a continuation of the topics discussed in earlier monographs, which were the result of joint research of Polish and Latin American geographers within many projects dedicated to urban issues. Academics of the Faculty of Geography and Regional Studies of Warsaw University have been lecturers at doctoral studies in urban and regional sustainable development and post-doctoral studies in Earth and Environmental Science at the University of Manizales in Colombia (Doctorado en Desarrollo Sostenible y Posdoctorado en Ciencias de la Tierra y el Medio Ambiente). Doctoral students and lecturers from the University of Manizales have visited Poland many times in joint symposia and workshops. In 2017 a Polish-Colombian monograph in Spanish was published in Colombia and in 2018 two scientific monographs, both in Spanish and English, were brought out by the University of Warsaw Press. This volume is the second of the two published in 2021 and contains only English texts on sustainable development, risk and local development in Poland, Colombia and some other Latin American countries.

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