Chapter 8 Geography of the COVID-19 pandemic and learnings for environmental sustainability

Capítulo 8 Geografía de la pandemia Covid-19 y aprendizajes para la sustentabilidad ambiental

ANTONIO-VIEIRA, Elías †* & NIÑO-CASTILLO, Isaías Naú

Universidade Estadual Júlio Mesquita Filho, Sao Paulo, Brasil
Universidad Autónoma de Guerrero

ID 1st Author: *Elías, Antonio-Vieira* / **ORC ID**: 0000-0002-3171-1943

ID 1st Coauthor: *Isaías Naú, Niño-Castillo* / **ORC ID**: 0000-0003-0728-3798, **CVU CONACYT ID**: 919978

DOI: 10.35429/H.2021.8.136.147

E. Antonio & I. Niño

*evieira371@gmail.com

N. Niño, M. Valencia and M. García. (AA. VV.) Productive System, Territory and Sustainability. Handbooks-TIII-©ECORFAN-Mexico, Guerrero, 2021.

Abstract

This review article was prepared under the Geography approach and promotes discussions about the contents it studies, which are based on comparative data between the group of publications that addressed aspects of the advent of the Covid-19 pandemic and the group of publications that he related it to environmental sustainability as a prevention of the emergence of other pandemics. When the objective, at the same time, refers to the presentation of the result of the comparison of the approaches used in the publications on the subject, which can serve to formulate deeper reflections of other authors, with the production of new studies and publication of academic articles on the topic addressed. To facilitate understanding of the text, the meanings of terms and concepts used were defined, such as Agenda 2030, sustainable development, Covid-19, Public Health Emergency of International Importance (ESPII), metaphor, mode of production and consumption, new coronavirus (SARS CoV-2), pandemic, public policy, resilience, environmental sustainability and zoonoses. The sample of publications used to compare the aspects derived from the pandemic with the adoption of measures proposed in the objectives and goals of the 2030 Agenda, of sustainable development, was also defined as a guiding tool for the society-nature relationship, for, between other outcomes to prevent recurrence of pandemics.

Pandemic, SARS-CoV-2 virus, Covid-19, Schedule 2030, Environmental sustainability

Resumen

Este artículo de revisión fue elaborado bajo el enfoque de Geografía y promueve discusiones sobre los contenidos que estudia, las cuales se basan en datos comparativos entre el grupo de publicaciones que abordaron aspectos del advenimiento de la pandemia por Covid-19 y el grupo de publicaciones que lo relacionaba con la sustentabilidad ambiental como prevención del surgimiento de otras pandemias. Cuanto el objetivo, por la vez, se refiere a la exposición del resultado de la comparación de los enfoques utilizados en las publicaciones sobre el tema, lo que puede servir para formular reflexiones más profundas de otros autores, con la producción de nuevos estudios y publicación de artículos académicos sobre el tema abordado. Para facilitar la comprensión del texto, se definieron los significados de términos y conceptos utilizados, tales como Agenda 2030, desarrollo sustentable, Covid-19, Emergencia de Salud Pública de Importancia Internacional (ESPII), metáfora, modo de producción y consumo, nuevo coronavirus (SARS CoV-2), pandemia, política pública, resiliencia, sustentabilidad ambiental y zoonosis. También se definió la muestra de publicaciones utilizadas para comparar los aspectos derivados de la pandemia con la adopción de medidas propuestas en los objetivos y metas de la Agenda 2030, del desarrollo sustentable, como una herramienta orientadora para la relación sociedad-naturaleza, para, entre otros resultados a fin de prevenir la repetición de pandemias. Y, finalmente, se incluyó una propuesta de política pública para mitigar el riesgo país a las pandemias.

Pandemia, Virus SARS-CoV-2, Covid-19, Agenda 2030, Sustentabilidad ambiental

Introducción

This article takes into account that among the lines of study of Geography in the field of environmental sustainability, in its relationship with health and communication, is the analysis of the occurrence of diseases in time and space, their presence and territorial mobility, as well as the conflicts that they can cause between flows and fixed and mobile populations[7], as is the case of the pandemic disease Covid-19 characterized below in a simplified form. In these terms, this approach proposes to present a position on the relationship between the aforementioned pandemic and environmental (in) sustainability (Niño-Gutiérrez, 2021), as well as to call the attention of local, regional and global governance.

That is to say, the growing process of globalization of socio-spatial activities, considering the effects on different forms and technical means of interrelation between society and nature, through its mode of production and consumption, explained in another paragraph below, not only offers an advantage to the prevailing interests of the actors that participate in its protagonism.

[7]For the scope of this article, the flows are the spatial circulations of people and goods and the fixed ones are the means of communication that generate the flows (transport vehicles), travel centers and hospitals for follow-up and medical care to patients affected by Covid-19, as well as, cemeteries and crematoria for those who died from this disease (AGUIAR, 2021).

But, it also presents a disadvantage for society as a whole, as is the case of the emergence and spread of diseases in the spatial aspect (Aguiar, 2021; Rabello; Oliveira, 2021), whose process has as one of the facilitators the exploitation, many times, unsustainable of natural resources by some segments of the activities of the mode of production and consumption, in different geographical scales between cities, regions and countries.

In this line of thought, Rabello and Oliveira (2021), proposing the multidisciplinary debate on environmental issues that they list, consider the advent of the pandemic by Covid-19 as "a warning for our society to reconsider its modes of production, consumption and exploitation of natural resources", as well as, states that zoonoses ( )" Ebola, swine flu, avian influenza, Zika virus, HIV, among others, were intermittent alerts of the emergence and situation of the current pandemic [...] ". However, it must be considered that these diseases have not been totally eradicated in the geographies of the world.

The main objective was to present the results of the interpretation of the approaches used in the four publications that served as a comparative basis, which may serve to formulate deeper reflections of other authors, with the production of new studies and publication of academic articles on the subject addressed. The study is justified by the fact that the Covid-19 pandemic, in the form in which it was disseminated, has the potential to stimulate the reformulation of governance and public policies on environmental sustainability at the global level. What are the contributions of the approaches used in the summaries and/or conclusions of the publications studied in this work, in which Covid-19 is related to its environmental setting, to promote discussion on the subject?

Methodology

Given this context, for the preparation of this article we consulted publications that addressed different focuses of the pandemic[8] caused by Covid-19, which allowed us to constitute two groups for analysis purposes. In the first group, diagnostic in nature since the beginning of this worldwide disease, a simplified knowledge of the characteristics of the virus was obtained, as well as the dynamics, socioeconomic impacts, management and effects of the disease on human behavior.

And the second group of publications, had a characteristic of prognosis of the relationship between society, natural resources, environment and sustainable development, to identify possible and simplified proposals for preventing the recurrence of pandemics by applying the objectives and goals of the Agenda 2030[9], of sustainable development[10], instituted by the United Nations, as will be detailed below. Thus, this article contributes in the way of approaching the subject, since the results presented here add to the formation of knowledge the contents that highlight the need to comply with the Agenda 2030, of sustainable development, and proceeding in this way, contribute to the reconstruction of the society-nature relationship, including the respect for Science and the compliance with the global agreements that address this issue.

In this sense, an approach to the Covid-19 pandemic is presented, under the approach of the necessary environmental sustainability advocated in the 2030 Agenda for sustainable development, which should focus on the society-nature relationship. It is noteworthy that the relevance of this study for the field of Geography lies in the fact that its approaches are able to demonstrate the spatial interrelationship between social factors and health phenomena, including the Covid-19 pandemic, in geographic space. In this case, the methodological approaches used in Geography allow to establish, for example, the cause and effect relationship between the mobility of the population, the performance of its mode of production and consumption, changes in the original geo-environmental conditions of the territories, i.e. the imbalance in the interrelationship between man and the environment (Barcellos et al, 2021), i.e. nature.

[8] Pandemic is the worldwide spread of a new disease and the term is used when an epidemic, an outbreak affecting one region, spreads across different continents with sustained person-to-person transmission (FIOCRUZ, 2021).
[9] The 2030 Agenda, which consists of a Declaration, 17 Sustainable Development Goals (SDGs) and 169 targets, seeks to ensure that all nations and all people around the world are included and benefit from the achievement of the SDGs. (UNHCR, 2021).
[10] Sustainable development is a development capable of meeting the needs of the current generation, without compromising the ability to meet the needs of future generations. (WWF, 2021).

Development

When approaching the sources of consultation that supported this study, the approach method was used, related to the reasoning adopted in the approach to the topic, and the procedural method, which refers to the way in which the stages of the work were developed. In the first, inductive reasoning was used, from the particular to the general, that is, from the analysis of data on the socio-spatial problems of the pandemic by Covid-19, for environmental sustainability as a whole. In the second, the historical method was used to verify the geographic facts resulting from Covid-19 in their relationship with environmental sustainability.

It should be noted that the management of the methodology of approaching the subject discussed here, the reflection of Souza (2009) was considered, in which the words "environment" and "sustainability", guiding the construction of the term "environmental sustainability", would be metaphors formulated in international institutions, which, full of political meaning, and without support in geography, would constitute contradictory elements to the socio-spatial reproduction of the aforementioned mode of production and consumption.

It should be clarified, therefore, that the term "environmental sustainability", catalogued as a metaphor, due to the lack of a conceptual theoretical basis in Geography, is used here in the context of the society-nature relationship, whose theoretical basis is well developed in this discipline. The use of this term is justified by the meaning of the word metaphor, i.e., it means "a figure of speech in which there is a transfer of meaning from one word to another, through an explicit non-comparison [...]" (Dicio, 2021). Therefore, he assumes that the term environmental sustainability would have been coined for didactic purposes, since it expresses a meaning more in line with the need of capitalism to consider the limitations of nature in its development process than the very concept society-nature methodologically validated by Geography.

As for the procedure, we used the consultation of indirect documentation through a search service of contents available on Internet sites, between 25/07 and 16/08/21, to form two groups of publications, the first with content focus on the emergence and initial effects of the pandemic and the second with focus on preventive measures that can be adopted in the face of the recurrence of pandemics. Therefore, the contents of the analysis of the first group of publications are presented as follows:

Preliminary reflections on the characteristics of the virus and the origin of Covid-19 in the Chinese metropolis of Wuhan and the association between wild animals and man, destruction of natural habitats (Carvalho, 2021); 2. Proposals regarding containment of virus spread, positive changes in the environment resulting from the imposition of quarantine as one of the determinants of low socioeconomic activity and temporary restrictions on spatial mobility, especially of motor vehicles and, indeed, reduction of environmental pollution, in addition to conjectures about new formats of interrelationships, including those at a distance due to reduced flows of professional and personal activities (A3 Magazine, 2021); 3. Impact of Covid-19 on small businesses, pointing out the strategies used to avoid paralyzing the economic activities represented by this segment, such as: online service and home delivery, reduced business hours, employee turnover (Sebrae, 2021); and 4. Effects of the Covid-19 pandemic on people's behavior in relation to the consumption of goods (Innocente, 2021).

In the second group of publications, in turn, the contents were obtained using the same information technology tool mentioned above, however, using the keyword "Pandemic and Environmental Sustainability" in which the publications inserted on the first page were selected, which, after being numbered, from 1 to 10, had each of their numbers written on a sheet of paper that was then folded so as not to allow them to be seen. The papers containing the numbering of the publications were then shuffled so that four of them were randomly selected, forming the sample by the publications numbered 2, 5, 9 and 10, which were marked in bold and underlined in the respective excerpt of the note sheet as follows:

How Covid-19 represents a challenge for sustainability; 2. The list of natural resources facing the Covid-19 pandemic in Latin America and the Caribbean; 3. Environment and pandemic; 4. Sustainability during times of pandemic (Covid-19); 5. Environment and pandemic; 6. Sustainable development after the pandemic (video); 7.

Coronavirus and the environment, a closer relationship than we think; 9. The coronavirus pandemic is more necessary than ever to act in favor of sustainable development; and 10. Likewise, as for the procedure, at the stage of the results of this study, it is set out below, where the relevant facts listed in the summary and/or in the conclusions and recommendations of each selected publication that addressed the relationship between Covid-19 and the public policy of environmental sustainability are highlighted.

Mode of production and consumption, one of the possible definitions of this concept is the socioeconomic system, of spatial and environmental character predominant in human relations with nature, which can be subdivided into several interdependent stages, whose current version moves, above all, by the intensive use of financial capital, information technologies, and permanent creation of consumption needs for the population. Such steps, in turn, do not always originate and conclude in the same spatial cut, since, in recent years, this system, in reproducing itself globally, was conditioned to the availability and adequacy of natural resources and labor, to the means of production and its technologies, and the particularities of the consumer society.

In short, the environmental consumption of the natural space by this system is configured from the stage of extraction of raw materials and/or products of cultivation and breeding of animals and birds, and their respective processing; manufacture of products, durable or not, for various purposes, trade often conditioned by numerous innovation and marketing strategies, in which the continuous and growing consumption becomes part of human nature, even when it is limited by the purchasing power of people (Bauman, Baudrillar, Drucher, Harvey; Padilha, Rodrigues apud Marchesini Júnior, 2021*).*

Public policy, among the numerous definitions of this concept, the following is used here: "are State actions for the social demands of societies" (HOFLING, 2001). While, *environmental sustainability*, refers to a characteristic of a process or state that can maintain the properties of the environment through space-time (López, 2021) and r*esilience*; one of the possible meanings of the word resilience used in this study is "the ability of groups and communities to cope with external stresses and shocks due to social, political and environmental changes" (Adger, *apud* Gonçalves, 2021). It should be added that it is not uncommon for the term resilience to be used in association with sustainable development (Pastorelli Júnior, 2018; Sebrae, 2019, Lemos, 2021).

In a retrospective analysis, it was found that the virus causing the Covid-19 pandemic received the name SARS-Cov-2, in February 2020, and was identified from an alert to the World Health Organization (WHO), due to the finding of pneumonia cases, at the end of 2019, in the metropolis of Wuhan. This urban agglomeration is located at the geographical coordinates: 30° 29' 54" North Latitude and 114° 15' 58" East Longitude (DB City, 2021), in the territory of the People's Republic of China, with a population of more than ten million people in 2015 and dense geographical connections with various parts of the world.

The strain of the new coronavirus is one of seven already identified (HCoV-229E, HCoV-OC43, HCoV-NL63, HCoV-HKU1, SARS-COV, MERS-COV, SARS-CoV-2), according to the Pan American Health Organization (PAHO) (2021b). Possible symptoms of this disease include fatigue, nasal congestion, conjunctivitis, headache and sore throat, fever, loss of taste or smell, and dry cough (PAHO, 2021; 2021a). Covid-19 disease, can cause "renal, cardiac and nervous problems, as well as changes in blood coagulation," according to an article published by Santos (2021). For Carvalho (2021), the disease in question is "transmitted by personal contact, from person to person" and "can progress to severe pneumonia, obstruction of the lungs and death from respiratory failure." As for the mutations of the virus, its occurrence and spread, they are associated with non-vaccination, as well as, with infected people, it can undergo variations and be transmitted (Aguiar *apud* Arantes, 2021).

The argument that local, regional and global governance has difficulties in dealing with the pandemic efficiently and effectively, is justified, at least, for the following reasons. In fact, on 12/04/2020, more than one million eight hundred thousand people were infected and 111 000 died (Vieira, 2020), by this relentless disease, which, in its trajectory of several waves of contamination of the human population, by different variants of the virus, exceeded in just over a year, that is, to date 08/13/2021, more than 205 million infected and four million three hundred thousand dead in the world geography (Table 8.1), whose figures can be considered catastrophic to humanity.

Table 8.1 Situation of the Covid-19 pandemic in the world (confirmed cases, deaths, vaccine doses)

Statistical data on the world as of 08/13/2021	
Confirmed cases of the disease in the population	205.338.159
Deaths from disease in the population by geographic region	
America	2.043.623
Europe	1.238.433
Southeast Asia	605.221
Eastern Mediterranean	247.045
Africa	125.145
Western Pacific	73.614
Total	4.333.081[1]
Vaccine doses administered to the population	4.428.168.759

Source: WHO, 2021

[1] = it should be noted that the total of 4,333,094, presented in the WHO coronavirus panel, differs from the sum of the quantitative by region presented by the institution.

In addition, an article published on 04/20/2020 entitled "Covid-19: end of the geography of hypermobility?" (Dumont, 2021), analyzed here, reveals antecedents of the pandemic, for example, in the cut of the Chinese socio-economic space and later in others, described below: A) the hygienic and sanitary conditions of a significant part of the Chinese urban population cannot be considered satisfactory; B) correlation between its spread; C) the geography of mobilities (rural emigration to urban territories, more developed as Wuhan), initially in the interior of China and then in South Korea, Taiwan, Japan, Hong Kong and Singapore, due to multiple geo-economic relations with China. Notably, as reported in the press, the disease subsequently reached Italy and other European countries, since then, its spread across Europe was relentless. "At the end of March, the United States became the most affected country in the world. By the end of May, America becomes the global epicenter of the pandemic [...]" (RTVE, 2021); D) WHO only recognized the existence of person-to-person transmission of the virus on January 23, 2020 and E) on January 30, 2020, WHO declared that the outbreak of the new coronavirus constituted a Public Health Emergency of International Concern (PHEIC), the highest alert level of the Organization, as provided for in the International Health Regulations. The declaration of the pandemic, in turn, took place on March 11 of that year, during which time the virus continued to infect people at all geographical scales. On the other hand, in the public policy of many countries, to combat the pandemic, it was noted, among others, some specific measures of restrictions on the interrelation of the population with the space, especially urban, and operation of production and consumption activities, such as "curfews, mandatory quarantines, restriction of freedom of movement and grouping [...]". Due to these governmental procedures, there are conjectures that these measures "test the foundations of democracy" (France 24, 2021), the focus of which will not be discussed here because it escapes the object of this study.

Moreover, despite the agile development and approval of preventive vaccines against Covid-19, by the end of 2020, especially in countries considered developed under a geo-economic perspective, the distribution and administration of vaccines in the world population as a whole did not take into account the principle of human equity, i.e. the need for timely universal access in all countries and, in these, throughout their age pyramid simultaneously. In addition to the difficulty of global governance to ensure the implementation of the aforementioned principle of equity, it should be noted that at least three reasons are observed for the fact that this pandemic disease has remained active, with greater or lesser extent and intensity, the geographical regions of Terra, until this time (16/08/2021) and yet it is not clear when it will be extinguished.

The first reason is attributed to the lack of equitable access to safe and effective vaccines, for various reasons, including production concentrated in a few countries that hold their patents and, in some countries, the logistical complexity of distribution and application in the population. The second reason is non-compliance with the sanitary protocol by population groups, whose reasons vary according to age, health education, socioeconomic background, cultural and ideological concepts, among others, and finally, the third reason refers to anti-vaccine and immunization behavior, or the denial of vaccine efficacy by segments of the population in different countries, including the adherence of some social and political leaders.

From this point of view, one of the possible inferences about governance deficiencies is the failure to ensure that the redefinition of global protocols inherent to the interaction between society and nature is actually practiced by the entire mode of production and consumption, as it is a collective and participatory assignment of governance and society as a whole.

However, the exhaustive analysis of the public policy of coping of Covid-19, is not part of the scope of this study, so there was no in-depth approach to the content available in the literature dealing with this aspect of the performance of local actors, regional and global governance. Notwithstanding this methodological reservation in this study, the exercise of citizenship and the vindication of fundamental human rights in the field of health and sustainable environment require suggesting reflections for the recreation of local, regional and global governance on other bases. And among the motivations that justify it is the hypothesis that there was no establishment of effective public policies on the relationship of society with natural resources in order to prevent the spread of contagions and impacts of the Covid-19 disease virus, and its variants, as reported in the following excerpts:

Covid-19 is a zoonotic disease (transmitted from animals to humans) but has spread from humans to humans very easily because of the high overcrowding and connectivity of our social structure. Part of the problem of zoonotic diseases, which has not been given much attention so far, lies in continuing to shift natural boundaries, as well as fragmenting, destroying and degrading ecosystems that have the capacity to "control" the spread of diseases (ECLAC, 2020).

And also:

The relationship of natural resources with the COVID-19 pandemic is very diverse [...]. On the one hand, they are essential factors for the control of the crisis (food, drinking water, biodiversity and electricity), and on the other hand, they are impacted by its consequences (use of fuels, minerals, etc.). Access to drinking water is fundamental because hand washing is one of the main measures to prevent the growth of contagions; energy and electricity are essential to guarantee water supply and living conditions in homes, as well as to ensure the functioning of hospitals; agricultural activity is the basis for maintaining food security; and finally, non-renewable natural resources are of great macroeconomic importance in most of the economies of Latin America and the Caribbean (ECLAC, 2020).

It is emphasized that, in the first fragment above, it is possible to infer that the lack of respect - by some parts of society and, sometimes, by those who have leadership and decision-making power, specifically, in the mode of production and consumption - to natural boundaries and ecosystems that, among others, have the function of preventing the spread of diseases, especially in the form of pandemics, is a behavior that should be reviewed as soon as possible.

The content data of the two groups of publications, mentioned in the methodology and procedures step, are presented below, with literal transcription, or with adaptations, following the order of the drawing.

Publication 2: The Role of Natural Resources in the Face of the Covid-19 Pandemic in Latin America and the Caribbean (ECLAC, 2021)

The 2030 Agenda and the biodiversity, water, energy and food targets are even more relevant. The pandemic increases the need to protect biodiversity, the urgency to respect and protect natural spaces, as well as to ensure their services to the population in a sustainable manner. It is possible that economic recovery can be built in coherence with the recovery of ecosystem health, but structural changes are required. [...] It is also recommended to promote the transition towards new, more sustainable, inclusive and climate change-adapted production models. A fundamental element [...] is to join efforts to preserve the diversity and integrity of ecosystems, respecting their natural boundaries and avoiding the fragmentation, degradation and destruction of habitats. This is a key task to protect human health, as it regulates dispersal and reduces the risk of contagion of zoonotic diseases.

The analysis in this publication reveals the importance of governments and populations meeting the goals of the 2030 Agenda for sustainable development as a fundamental measure to protect human health from the risk of disease transmission, as there is the possibility of a recurrence of pandemics.

Publication 5: Environment and Pandemics (Carabias, 2021)

In this publication, the author presents eight themes for reflection on the environment and pandemic as follows:

1. Reconstructing the relationship with nature and respecting natural ecosystems.
2. Reorganize the economy with environmental sustainability.
3. Radically change consumption and production patterns.
4. Transform cities in sustainability and resilience.
5. Promote diversified, resilient and sustainable rural development.
6. Science-based decisions about the future.
7. Regain confidence in multilateral institutions, comply with global agreements and turn them into actions on the national agenda.
8. Promote a change of attitude towards a culture of sustainability and respect for nature.

The analysis of these topics allows inferring that, although the author does not directly mention the source, almost all of their contents are related to the procedures contemplated in the Sustainable Development Goals (SDGs) of the 2030 Agenda.
Publication 9: The coronavirus pandemic is more necessary than ever to act in favor of sustainable development (United Nations, 2021).

This publication, in addition to emphasizing the role of the United Nations in addressing the effects of the pandemic, including assisting governments, recommends the 2030 Agenda for sustainable development and global agreements as the compass for navigating the world, as shown in the following summary.

Under-Secretary-General Amina J. Mohammed said lives and livelihoods around the world depend on the ability of the United Nations to support governments in combating this "unprecedented health, humanitarian and socioeconomic" crisis.

Calling the Sustainable Development Goals, which fall under the 2030 Agenda for Sustainable Development, "the compass" needed to guide us, he also cited the Paris Agreement on Climate Change and the Addis Ababa Action Agenda on Financing for Development among the compacts that should mark the world's navigation chart.

"We will have to keep in mind a dual mandate: to respond urgently to curb the effects of the pandemic, while at the same time assisting in the performance of governments and the population so that they can regain a better and more resilient future," Mohammed said. Similarly, he said that when the time comes to allocate resources, special attention will be given to the needs of countries affected by conflicts and disasters, least developed countries, landlocked developing countries and small island developing states.

As mentioned in the previous issue, this publication highlighted the need to use the 2030 Agenda, for sustainable development, as well as, the Paris Agreement on Climate Change and the Addis Ababa Action Agenda on Financing for Development, among the compacts that should signal action by governments and people in navigating the world.

Publication 10: The pandemic and the challenges of sustainability - learning on World Environment Day (Hernandez, 2020).

In summary, this publication defends the idea of rethinking the requirements of the so-called sustainable urbanism in which there are cities resilient to pandemics, whose parameters are contained in the 2030 Agenda for sustainable development, as shown below:

In summary, urban planning, architecture and urbanism in general, must rethink the components of the matrix of sustainable urbanism from making cities more resilient to the new threat: pandemics. This does not imply forgetting that the main challenges of cities remain, among others, the following: the reduction of inequalities and urban segregation; the curbing of environmental degradation and the management of uncertainties associated with climate change and with the change of the model.

Thus, the relevant results obtained through the comparative analysis between the contents on the emergence and initial effects of the pandemic and the second with a focus on preventive measures that can be adopted in the face of the recurrence of pandemics, as mentioned above, are described below:

1. Protection of biodiversity, the urgent need to respect and protect natural spaces, as well as to ensure their services to the population in a sustainable manner, highlighting compliance with Agenda 2030.
2. Reconstruction of the society-nature relationship, respecting natural ecosystems, adopting a means for sustainability and resilience of urban and rural areas, decisions based on respect for Science and compliance with global agreements.
2. Role of the United Nations not to support governments in the fight against this health, humanitarian and socio-economic crisis, and the 2030 Agenda for Sustainable Development, the Paris Agreement on Climate Change and the Addis Ababa Action Agenda on Financing for Development, among the pacts that should mark the world's navigation chart.
3. Rethinking the components of the sustainable urbanism matrix has as main challenges in cities: the reduction of inequalities and urban segregation; the curbing of environmental degradation and the management of uncertainties associated with climate change and with the change of the model.

Discussion

In this topic, comparisons are made between the results previously mentioned in publications No. 2, 5, 9 and 10, and the works that mostly addressed facts related to the characteristics and origin of the virus in the metropolis Wuhan, China, its association between wild species, animals and man, the destruction of natural habitats, etc., the containment of the spread, the impact of Covid-19 on small businesses, indicating the strategies used to not paralyze the economic activities that this segment represents, as well as the effects of this pandemic on human behavior.

As a result of this analytical comparison of contents, the answer to the proposed problem was obtained, as well as the objective established for the development of this work, as shown below. Both the problem and the objective proposed in this work are solved with the contributions of the approaches used in the summaries and/or conclusions of the publications studied, relating Covid-19 to environmental sustainability. That is, they refer to measures to prevent the recurrence of the spread of diseases through compliance with the Agenda 2030, sustainable development, and global agreements, which, in short, proclaims the need to rebuild the relationship between society, and its mode of production and consumption, with nature. This process includes respect for natural ecosystems, decisions based on the guidelines of Science (Niño-Gutiérrez, 2020), the adoption of sustainability measures and urban and rural resilience (Niño-Castillo, et al, 2020), which encompasses the reduction of inequalities and the solution to segregation among people.

Likewise, these approaches may serve to formulate deeper reflections by other authors on the topic addressed, resulting in an open path for other research to follow in the study, promotion and development of new articles that disseminate the content of the 2030 Agenda on sustainable development and global agreements, whose implementation is attributable both to local, regional and global governance, as well as to the populations and their institutions as a whole.

Conclusions

As can be appreciated in the previous theme originating from the interpretation of the approaches used in the four publications that served as a basis, this work defends, as a solution for the prevention of the recurrence of pandemics, the measures included in the 2030 Agenda, of sustainable development in the form of environmental sustainability goals and targets, and in the global agreements, to which, at the same time, local, regional and global governance, the respective populations and their institutions are obliged.

Therefore, the problem and objective posed in this study was duly resolved, since the contributions of the indirect research sources, and mainly of the summaries and/or conclusions of the publications studied, fundamentally addressed the need to promote reflections and discussions for the adoption of measures to prevent the recurrence of pandemics, including the publication of new academic articles in order to disseminate the subject to society as a whole.

References

ACNUR_Agenda 2030 (2021). https://www.acnur.org/portugues/temas-especificos/agenda-2030-para-o-desenvolvimento-sustentavel-ods/

Aguiar, S. (2021). *Covid-19: la enfermedad de los espacios de flujo*. https://periodicos.uff.br/geographia/article/view/42848/24513

Arantes, J. T. (2021). Los físicos de la Unicamp crean un modelo para predecir las mutaciones del SARS-Cov-2. *Boletín FAPES*P, 13 ago 2021.

Barcellos, C.; Buzai, G.; Handschumacher, P. (2021). *Geografía y salud: ¿qué está en juego? Historia, temas y desafíos*. https://journals.openedition.org/confins/14954

BVS-Biblioteca Virtual en Salud. *Zoonosis: concepto*. http://red.bvsalud.org/lis-rede-BVS/resource/27470#.YRowVc1Ki1s

Carabias, J. (2021). *Medio ambiente y pandemia*. https://www.nexos.com.mx/?p=48399

Carvalho, R. C. T. (2020). La relación entre el medio ambiente y la pandemia de coronavirus. *Revista Consultor Jurídico*, 28 de marzo de 2020. https://www.conjur.com.br/2020-mar-28/ambiente-juridico-relacao-entre-meio-ambiente-pandemia-coronavirus

CEPAL (2021). *La lista de recursos naturales antes de la pandemia por COVID-19 en América Latina y el Caribe.* https://www.cepal.org/es/enfoques/rol-recursos-naturales-la-pandemia-covid-19-america-latina-caribe

DB City. *Wuhan*. https://pt.db-city.com/China--Hubei--Wuhan

Dicio-Diccionario en línea de portugués. *Definición de metáfora*. https://www.dicio.com.br/metafora/

Dumont, G. F. (2020). Covid-19: ¿fin de la geografía de la hipermovilidad?. *Les analyses the Population & Avenir*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3614374

FRANCE 24. (2021). *Las medidas ante la crisis por el Covid-19 que ponen a prueba los cimientos de la democracia*. https://www.france24.com/es/20200403-crisis-coronavirus-riesgo-democracia-militares-toques-de-queda

FIOCRUZ. (2021). *¿Qué es una pandemia?*. https://www.bio.fiocruz.br/index.php/br/noticias/1763-o-que-e-uma-pandemia

Gonçalves, C. (2021). *Regiones, ciudades y comunidades resilientes: nuevos principios de desarrollo*. https://www.scielo.br/j/urbe/a/8BgYDHQ988spp6CW5XyBkTm/?lang=pt

Hernández, A. (2020). *La pandemia y los desafíos de la sostenibilidad: aprendiendo en el día mundial del medio ambiente.* Colombia: Universidad de los Andes.

Höfling, E. M. (2001). Políticas estatales y sociales (públicas). *Cadernos Cedes*. Campinas, Centro de Estudos Educacao e Sociedade (Cedes). Año XXI, Núm. 55, pp. 30-41.

Innocente, I. (2020). Pandemia y Sostenibilidad: impacto en el consumo y los negocios. https://mercadoeconsumo.com.br/2020/05/01/pandemia-e-sustentabilidade-impacto-no-consumo-e-negocios/

Lemos, M. F. (2021). *Sostenibilidad y Resiliencia*. http://www.anparq.org.br/dvd-enanparq 3 / htm / Artigos / ST / ST_AS_003_4_LEMOS.pdf

López, V. M. (2021). Génesis, evolución e incertidumbres del concepto de sustentabilidad. *Entretextos*, 12(36), 1-10. https://revistasacademicas.iberoleon.mx/index.php/entretextos/article/view/198/125

Marchesini Júnior, A. (2012). La producción y el consumo de espacio en la actual "sociedad de consumo". *Revista de Geografía de América Central*, 2(1), 6-7. http://revistas.una.cr./index.php/geografia/article/view/2113

NACIONES UNIDAS (2020). La pandemia del coronavirus hace más necesario que nunca actuar en favor del desarrollo sostenible. https://news.un.org/es/story/2020/05/1474162

Niño-Castillo, I. N.; Niño-Gutiérrez, N. S.; Niño-Castillo, J. El. & Rojas-Copa, A. E. (2020). Territory, vulnerability and sustainability in the coastal-tourist strip of Acapulco bay. *Journal of Business Development Strategies*. 6(17), 7-19. https://www.researchgate.net/publication/348380181_Territory_vulnerability_and_sustainability_in_the_coastal-tourist_strip_of_Acapulco_bay_Territorio_vulnerabilidad_y_sustentabilidad_en_la_franja_costera-turistica_de_la_bahia_de_Acapulco

Niño-Gutiérrez, N. S. (2021). Socioformación y distribución espacial del COVID-19 en Guerrero, México en el primer semestre del 2020. En Luna-Nemecio, J. M. y Tobón, S. (Coords). *COVID-19: retos y oportunidades para la socioformación y el desarrollo social sostenible*. México: Universidad de Olavide-CICSHAL-Kresearch. Pp. 201-228. https://doi.org/10.35766/b.rosds.21.08

Niño-Gutiérrez, N. S. (2020). Socioformation as a link in two face-to-face tourism programs in Acapulco. *FORHUM international Journal of Social Sciences and Humanities*. 2(3), 78-89. https://www.researchgate.net/publication/343498430_Socioformation_as_a_link_in_two_face-toface-_tourism_programs_in_Acapulco

Oliveira, L. N; & Aquino, C. M. S. (2020). Definiciones y aplicaciones de resiliencia en ciencia geográfica. *Revista del Departamento de Geografía. Universidade Federal do Piauí*. 39(1), 1-13. https://www.revistas.usp.br/rdg/article/view/159581

OMS (2021). *Panel de control de coronavirus de la OMS (COVID-19).* https://covid19.who.int/

_____ (2021). *Vacunas Covid-19: información producto por producto*. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines

OPS (2021). *Historia de la pandemia Covid-19*. https://www.paho.org/pt/covid19/historico-da-pandemia-covid-19

_____ (2021). *Hoja de datos de Covid-19.* https://www.paho.org/pt/covid19

_____ (2021). *Panel del Coronavírus de la OMS (COVID-19).* https://covid19.who.int

Pastorelli Júnior, J. H. (2018). *Estudio de sostenibilidad y resiliencia urbana en el contexto de la reducción del riesgo de desastres*. Universidad Estatal de Campinas, Facultad de Ingeniería Civil, Arquitectura y Urbanismo. Campinas: Unicamp.

Rabello, A. M. & Oliveira, D. B. (2021). *Impactos ambientales antropogénicos y aparición de pandemias*. https://acoescovid19.unifesspa.edu.br/images/conteudo/Impactos_ambientais_antr%C3%B3picos_e_o_surgimento_de_pandemias_Ananza_e_Danielly.pdf

RTVE (2021). *La Covid-19 da la vuelta al mundo.* https://www.rtve.es/noticias/coronavirus-graficos-mapas-datos-covid-19-espana-mundo/

REVISTA A3. *Pandemia y medio ambiente: ¿impactos momentáneos o nueva normalidad?* https://www2.ufjf.br/noticias/2020/04/24/pandemia-e-meio-ambiente-impactos-momentaneos-ou-nova-normalidade/

Santos, M. T. (2021). *Las diferencias y similitudes entre otros coronavirus y Sars-CoV-2*. https://saude.abril.com.br/medicina/as-diferencas-e-semelhancas-entre-o-sars-cov-2-e-outros-coronavirus/

SEBRAE (2021). *El impacto de la pandemia de coronavirus en las pequeñas empresas*. https://www.sebrae.com.br/sites/PortalSebrae/artigos/o-impacto-da-pandemia-de-coronavirus-nos-pequenos negocios, 192da538c1be1710VgnVCM1000004c00210aRCRD

_____ (2019). *Ciudades resilientes y sostenibles*. Cuiabá, MT. Illinois: Sebrae.

Souza, M. A. A. (2009). Medio ambiente y desarrollo sostenible. Las metáforas del capitalismo. *Cronos*, 10(2), 101-117.

Vieira, E. A. (2021). Covid-19 y las razones para recrear la gobernanza mundial sobre otras bases. *Revista Geographos*, Universidad de Alicante, España. https://web.ua.es/es/giecryal/documentos839/documentos-materiales-y-publicaciones-de-los-miembros-del-grupo.html