01

Presentation date: February, 2024
Date of acceptance: July, 2024
Publication date: September, 2024

# CLIMATE CHANGE

## SEEN FROM THE PERSPECTIVE OF THE CONTEMPORARY KNOWLEDGE REVOLUTION

## EL CAMBIO CLIMÁTICO VISTO DESDE LA PERSPECTIVA DE LA REVOLUCIÓN CONTEMPORÁNEA DEL SABER

Eduardo López Bastida [1*]
E-mail: esaenzdeburuaga@gmail.com
ORCID: https://orcid.org/0000-0003-1305-852X
Henrry Ricardo Cabrera [1]
E-mail: henrryricardocabrera@gmail.com
ORCID: https://orcid.org/0000-0002-3185-8929
Denis Fernández Álvarez [1]
E-mail: dfernandez@ucf.edu.cu
ORCID: https://orcid.org/0000-0003-0451-7130
Jesús Rafael García Lorenzo [1]
E-mail: jesusrafaelgarcialorenzo@gmail.com
ORCID: https://orcid.org/0009-0003-3307-1040
Alejandro Valdés López[2]
E-mail: A350923@alumnos.uaslp.mx
ORCID: https://orcid.org/0000-0002-8503-3025
[1] Universidad de Cienfuegos, ¨Carlos Rafael Rodríguez¨ Cuba
[2] Centro de Investigación y Estudios de Posgrado, Facultad de Ciencias Químicas, Universidad Autónoma de San Luis Potosí. México.
* Author for correspondence

Suggested citation (APA, seventh ed.)

López Bastida, E. J., Ricardo Cabrera, H., Fernández Álvarez, D., García Lorenzo, J. R. & Valdés López, A. (2024). Climate change seen from the perspective of the Contemporary Knowledge Revolution. ***Revista Universidad y Sociedad, 16***(5), 11-19.

ABSTRACT

The accelerated development of science and technology has been one of the characteristic features of the late 20th century and early 21st century. This has caused profound changes in the conception of knowledge, which in turn have caused transformations in daily material and spiritual life and in relationships with other humans and nature. These changes have replaced the stability that prevailed for centuries and created, independent of their successes, unknown emerging problems that put the future of humanity in great uncertainty, such as climate change. This work aims to make a reflective analysis of how to confront the problem of climate change from the perspective of this Contemporary Revolution of Knowledge, proposing new paradigms related to the need to conceive a second-degree epistemology, the change from the simplistic ideal to that of complexity, the consideration of environmental problems in a holistic way, assuming in all decisions between humans and nature a global bioethics that provides social responsibility, and the introduction of a new integral, ecological, and intercultural economy.

Keywords: Contemporary revolution of knowledge, Climate change, Emerging problems, Bioethics.

RESUMEN

El desarrollo acelerado de la ciencia y la tecnología ha sido uno de los rasgos característicos de finales del siglo XX y principios del XXI. Esto ha provocado cambios profundos en la concepción del conocimiento, que a su vez han provocado transformaciones en la vida cotidiana, material y espiritual, y en las relaciones con los demás seres humanos y con la naturaleza. Estos cambios han sustituido la estabilidad que prevaleció durante siglos y han creado, independientemente de sus éxitos, problemas emergentes desconocidos que ponen en gran incertidumbre el futuro

de la humanidad, como el cambio climático. Este trabajo pretende hacer un análisis reflexivo de cómo enfrentar el problema del cambio climático desde la perspectiva de esta Revolución Contemporánea del Conocimiento, proponiendo nuevos paradigmas relacionados con la necesidad de concebir una epistemología de segundo grado, el cambio del ideal simplista al de la complejidad, la consideración de los problemas ambientales de manera holística, asumiendo en todas las decisiones entre humanos y naturaleza una bioética global que proporcione responsabilidad social, y la introducción de una nueva economía integral, ecológica e intercultural.

Palabras clave: Revolución contemporánea del saber, Cambio climático, Problemas emergentes, Bioética.

## INTRODUCTION

Since the 1950s, an era characterized by profound and accelerated changes in knowledge management has been taking place. By the beginning of the 21st century, these changes have become so accelerated that there is talk of a Contemporary Revolution of Knowledge that leads to a new era, in a new world (Delgado, 2019; Luz et al., 2022). This metamorphosis, known as an inadvertent revolution, is directly linked to material changes in people's lives due to the production and almost obligatory use, in daily life, of a number of devices, instruments, and machinery of all kinds. These have simultaneously caused spiritual changes in social relationships, ways of thinking, and people's customs. On the other hand, there has been a transformation in science and technology, which, merged into a technoscience difficult to separate, produces important impacts on the way of conceiving knowledge, with information and knowledge predominating over wisdom (Delgado, 2007; Liao et al., 2017).

These changes have produced a whole series of advantages, such as a significant advance in the field of science, where many professions and disciplines use the scientific method to study the natural world, which leads to a greater understanding of nature and a series of important inventions. The development of medicine has gone deepen to study the human body and understand how the organs function, which leads to better treatment of diseases and a longer life expectancy. In relation to the development of industry, new inventions allow people to produce more goods in less time, which has led to an increase in people's living standards and greater prosperity. The development of agriculture allows us to study the way crops are developed and understand how production can be improved, providing greater efficiency in the field and a greater abundance of food. Furthermore, the development of technology and innovation shortens the distance between scientific discoveries and their application, allowing people to access a greater amount of information, leading to a higher level of education and understanding of the world. Also, the development of economic sciences provides for studying the way in which goods can be produced and distributed more efficiently and effectively, providing greater prosperity and abundance of goods (Sangucho, 2024; López, 2014).

But on the other hand, these advances have presented contemporary society with a whole series of environmental, cultural, scientific, technological, social, and ethical challenges, called emerging problems, which mean that humanity is facing global changes with uncertain forecasts. This entails experiencing a crisis, which has multiple dimensions: environmental, food, economic, ethical, health, citizen, institutional, energy, social, etc. We are in the presence of an exhausted civilizational pattern, in which human well-being is identified with the accumulation of material objects and unlimited growth, which results in a systemic conflict between the conditions that make life on Earth possible and the destruction of its bases: land, capital, and work. Among these emerging problems, which constitute a great lifestyle contradiction, we can mention (Delgado, 2019; Horwich, 2024; López, 2014):

**Social injustice:** Although material and energy consumption has grown much more than the increase in population in the last 100 years, the inequality gap between countries, and within them, has grown considerably. In comparison, 50% of the world's population has only 1% of the world's wealth, with more than 2 billion people in the world living in poverty, of which almost 30% live in extreme poverty. This social injustice is the most immoral sign of current civilization and is directly associated with the current development models of cumulative historical processes of economic, political, social, and cultural exclusion. Without equity in the distribution of goods and services, it is not possible to build ecologically sustainable and socially just societies.

**Information overload without wisdom:** Today we are faced with a society saturated with information that doubles every three months and a pace of knowledge that doubles every 15 years, but lacking in the production of wisdom that guides based on how much can be done and what deserves to be done. This places humanity in the impossibility of finding precise and definitive ethical answers, to clearly and precisely define the limits of good and bad, ethical and unethical, right and wrong, fair and unfair.

**Overexploitation of natural resources:** Despite the scientific and technical development achieved, which

makes better use of supply, regulatory, cultural, and support ecosystem services, unbridled, selfish, and unfairly distributed consumerism of raw materials and energy exceeds the Earth's capacity to provide these services. This imposes sustainable growth limits to continue enjoying these services.

**Lack of ethical thinking:** The increase in the depth and scope of technoscience has often been used for political, ideological, and military purposes contrary to the ideals of the good of humans and nature. This has made it possible to lose the candor of societies regarding science and technology and the social use of knowledge, causing concern about the honest aptitude for the use of this technoscience. Special attention deserves the use for purposes of war, terrorism, and arms spiral that endangers, by reality or accident, the life of the planet, causing political and economic instability and environmental and social damage to its surroundings. Additionally, the theft of a large volume of human, material, and scientific resources that could be used for sustainable development is of particular concern.

**Social instability:** In humanity, stability that prevailed for centuries has been replaced by change, causing great uncertainty about the future, doubts, disorientation, anguish, loss of religiosity, insecurity, and depression, which predominate in a large part of the world's population. This implies the need to form morally responsible subjects, capable of raising awareness of the ethical dilemmas of science and technology, forming values and virtues with new paradigms that, although they do not exclude scientific knowledge in decisions, do not have to have the last word nor be unique, demonstrating that these cannot be reduced to simple and discrete conceptions.

**Unsustainability:** All of these problems mentioned above in one way or another influence the deterioration of the environment with reserved predictions for a sustainable future of the planet. These have passed in a few decades from the predominance of local and regional environmental problems to global problems. According to the World Economic Forum (2023), half of the top 10 global risks for the next 10 years will be environmental risks. To resolve them, it is necessary to change paradigms in human behavior, which require immediate and efficient responses from different conceptions, disciplines, edges, and perceptions. The three environmental problems that present the greatest challenge are climate change, biodiversity loss, and environmental pollution.

This work aims to make a reflective analysis of how to confront the problem of climate change from the perspective of the contemporary revolution of knowledge, which we have tried to summarize in this introduction.

## MATERIALS AND METHODS

An emerging problem, such as climate change, is one that rises unexpectedly or becomes apparent over time, often due to complex interactions or changes in a system. Due to their nature this kind of problems require immediate attention (López et al., 2024). These problems are of different types, such as social, economic, environmental, or political, and can have a significant impact on society and the environment. Emerging problems are often complex and multifaceted, requiring a coordinated and effective response from the social actors involved to adequately address them. For their analysis from the vision of changing paradigms in the way knowledge is used, research must be carried out fundamentally in five directions:

**Taking into account a second-order epistemology.** Epistemology, when studying the nature, possibility, scope, and foundations of knowledge, must recognize that the researcher belongs to the same order of reality that they investigate. This implies considering the possibility of extending the field of observation to their own subjectivity, which is always incommensurable. Everyday life must be studied not as marginal, casual, or singular phenomena, but as forms of change and emergence that involve all sciences (Delgado, 2019; Piñero, 2023).

**Changing the simplistic ideal for that of complexity.** Complexity, which at the same time includes the dialectic and the systemic, helps to understand the world in terms of dynamic systems and recognize that the different levels where it is inhabited (physical, biological, anthropological, socioeconomic, political, and spiritual) are interconnected in a balance that cannot be broken. It has three main lines of work and understanding, which are: complexity focused as a science, as a way of thinking, and as a worldview (Cabrera & José, 2004; Maldonado, 2023, Valdés et al., 2020).

**Considering environmental problems holistically.** This consideration must take into account the intrinsic value of nature and the place of humans as part of a system. It is based on the criterion that the disciplinary and even scientific frameworks for posing problems are narrow and make the search for solutions impossible. It is necessary to consider, teach, and demonstrate the idea of accepting full responsibility for biological and cultural survival to the preservation of the environment (Cardoso, 2023; Delgado, 2019).

**Assuming global bioethics in all decisions.** This discipline has the objective of changing knowledge and

reflection in consideration of the ethical problems raised by the development of science and technology. It is an ethic that combines the humility of knowledge, responsibility, interdisciplinary and intercultural approaches that give meaning to life. Its main conditioning is the search for wisdom for human survival through the creation of bridges between specialties, disciplines, and people (Potter, 2002; Delgado, 2019).

**Reformulating a new economy.** The new economy cannot be only economic; it has to be comprehensive, ecological, social, ethical, at the service of current and future humans, that conserves nature and is based on human and humanizing science and consciousness. In addition to traditional economics, we should talk about ecological economics, economics of human resources, environmental economics, health economics, circular economy, social economy, economy of the common good, knowledge economy, etc. By establishing a good dialogue between science and policy, the key words should be: eco-socio-efficiency, eco-socioefficacy, and eco-socioeffectiveness (López, 2020; Maidana & Costanzo, 2013).

According to the above, academic work on such a complex topic inherently demands a multidisciplinary approach. However, it is known that channeling coordinated efforts towards an objective can be a demanding task, especially if a common framework is not followed in terms of information management and/or the objectives pursued. Therefore, this work performs an analysis of the literature seeking to clearly define the perspectives of the topic, the challenges related to climate change, but also possible opportunities.

## RESULTS AND DISCUSSION

Documents on climate change have different visions of analyzing the problem, depending on who produces them. Political, scientific, and religious ones predominate due to their importance. In one way or another, they reveal the thinking, doing, and feeling of the authors, making it necessary to find a consensus among them to confront the problem. The majority seems to agree that confronting climate change requires the following conditions (Bravo et al., 2021; Lee et al., 2023; Pathak et al., 2022):

- It requires a coordinated response: The solution to the problem requires the participation and coordination of various social actors.
- Changing: The study of climate change can evolve over time and require adaptations in the response.
- Interdependent: Climate change problems are closely interrelated with other emerging problems.
- Paradigm changes: The solution requires the formation of new values, ideas, and a distinctive focus on the knowledge economy.

From the perspective where the analysis is carried out, the main paradigm changes should be concentrated in the following aspects:

**Second order epistemology:**

For Ceberio (2022), "the term epistemology derives from the Greek episteme, which means knowledge, and is a branch of philosophy that deals with all the elements that seek the acquisition of knowledge." It investigates its foundations, limits, methods, and validity. The contemporary revolution in knowledge makes it necessary to produce theoretical and formal changes in the way of acquiring and questioning this knowledge, which at the same time produce new questions regarding practice and life, called second-order epistemology. When transferring these conceptions to climate change, the main questions that must be taken into account for their analysis may be:

• Climate change research must have reflexivity, which means the close interaction between knowledge and social reality. Not only should the development of theories and models be the objective of research; it is also important to know the influence that knowledge has on the very constitution of society. Hence, the importance of complementing and interrelating the results of research carried out in the exact and technical sciences with that carried out by the social sciences, to achieve greater comprehensiveness.

• In the research process, both the object and the subject of research are equally involved and interrelated. This implies that different forms of knowledge and praxis can correspond to diverse, contextualized truths and situations that depend on both the subject and object of research, as well as the instruments used. The subject has important epistemological conditioning, which, in addition to knowing and reflecting on the social conditions of its existence, is constituted and modified by action in the same cognitive process.

• The results of the investigations must be based on formal and sociohistorical criteria. The formal criterion performs the contrastive function of the theories; the objectivity of knowledge depends on the criteria generated by the community of researchers, and scientific theory is justified as critical and systematic knowledge. That is, the central thing is to explore and analyze the theory in its contradictions and contrasts in order to apply it.

• The object of study of climate change depends on the social development achieved, which delimits the

configuration of the object of science: what to know. Knowledge, in addition to being an external, general reality delimited in a time-spatial dimension and independent of human thought, is mainly an object constructed by science; what is knowable and can be studied about social reality through knowledge. It depends on the development of society itself and the degree of progress achieved by social research activity.

• It is important to take into account the diversity of perspectives, which implies the incorporation of a "political epistemology" that integrates the production of knowledge with the political dimension; it implies an openness to other "non-experts" who need to be listened to. Political epistemology is a synthetic way of stating the relationships, more than circumstantial, between political practices and the uses of scientific knowledge in complex social contexts.

• Climate change entails a new education based on learners' competencies in systemic thinking (understanding relationships), anticipation competencies (understanding and evaluating future scenarios), normative competencies (norms and values of actions), strategic competencies (implementing innovative actions), collaboration competencies (learning from others), critical thinking competencies (questioning norms, practices, and opinions), self-awareness competencies (role of each one), and integrated problem-solving competencies.

**Complexity:**

Contemporary science and all culture and the contemporary world increasingly behave like highly interrelated systems that are difficult to predict accurately in their evolution and behavior. Complexity is the science of analyzing and reflecting on certain aspects of nature, society, and thought, of these behaviors. These are characterized by non-linearity, emergence, self-organization, and synergies, which have changed the conceptual and praxis frameworks of science and technology in relation to their determination and causation.

The study of climate change, for example, is typical of the sciences of complexity. Learning from nature means learning natural times; natural times are much broader than human times, and certainly not unique causes of much uncertainty. Nature, like the universe and life, is the result of subtle effects, specifically studied by the science of chaos; which analyses ordered but unpredictable systems, making it difficult to forecast. The three dimensions of complexity have adequate application to climate change phenomena when analyzing it as a science, way of thinking, and worldview.

Complexity as a science demonstrates the impossibility of predicting, with the accuracy inherent to linear causality predominant in the ideas of simplification, the future states of systems; not because there is a lack of knowledge or instruments to carry out accurate investigations, but because systems are unpredictable and exposed to uncertainty. This changes concepts such as time, reality, stability, change, determination, and causality. New notions emerge such as chaos, disorder, instability, sensitivity to initial conditions, bifurcations, fluctuations, turbulence, systems far from equilibrium, self-organization, dissipative structures, among others, which have decisive importance in the new interpretation of nature and society.

In this regard, complex thinking can be defined as a set of mental skills that allow advanced actions to be carried out through the ability to understand different realities with totalization, synthesis, and integrality of what is thought; this provides a globalizing function that tries to encompass all perspectives to understand reality. It is developed and requires mastery of three fundamental principles: Dialogue: the coherence of the system appears with the paradigm; recursiveness: the ability of feedback to modify the system; and hologram: the part in the whole and the whole in the part.

The complex worldview of climate change is important to serve as a guide towards a future scenario, this worldview being the most appropriate to seek a change of mentality and thinking based on the participation of everyone with a transdisciplinary approach. In addition to the complex approach, it includes the systemic, holistic, bioethical, dialectical, and ecological approaches that provide a way of thinking, feeling, and acting, both scientific and ideological. Complexity as a worldview opens the need for a new correlation between value and responsibility, from a dialogue of interests between science-technology-society.

**Bioethics:**

Global bioethics is perhaps the most integrative of the five aspects raised here. Defined by its creator: "Bioethics should be seen as a cybernetic approach to the constant search for wisdom, which I have defended as the knowledge of how to use knowledge for human survival and to improve the human condition" (Potter, 2002).

The problem of climate change is perhaps the field of global crises where the need for interaction of ethics with science and politics is most evident. The report of the Intergovernmental Panel on Climate Change (IPCC, 2018) recognizes this reality by stating: "Ethics and equity considerations can help address the unequal distribution of adverse impacts associated with global warming levels of 1.5°C or higher, as well as mitigation and adaptation,

particularly with respect to the poor and disadvantaged populations, in all societies (high level of confidence)."

The inclusion of bioethics in the analyses of climate change provides the following elements:

• Deep ethical reflection is needed to understand the meaning of time and life. These ultimately define the direction of politics and science, although many do not want to see it this way.

• Ethics links and harmonizes the cognitive, axiological, deontological, anthropological, prescriptive, and formative elements by facilitating the integration, foundation, prescription, and teaching of the fundamental links between all of them.

• Scientific-technical solutions, as well as climate change policies and their interaction, require emerging and new forms of being-doing-relating, as socio-ethical-political-cultural action.

• The problems of climate change require supporting the implementation of new principles of inclusion, sustainability, equity, and justice.

• The solutions to climate change need to permanently learn, unlearn, and relearn various forms, modes, and conditions of negotiating, combining, and associating what requires an ethical dialogue, which combines reason and passion.

This new ethics must be characterized by: a bio-centrist ethics, holistic ethics, ethics that must recognize the limits of technology, ethics of life production, ethics that must recognize that man's relationships with nature are dialectical, systemic, and complex, ethics that must change man's role from conqueror of nature to a simple member and citizen of it, ethics that goes beyond the purpose of granting nature an instrumental, economic, or universal value, ethics of responsibility, ethics of recognition of the creature of the earth, ethics of imagination rather than reason, ethics of exchanges and resolution of conflicts between individuals, and a complementary ethics.

**Environmental holism**

Given the need to think about the place of human beings in the system of nature, when considering the intrinsic value of nature and the place of human beings as part of a system and not as dominating parts, it is necessary to pass from a weak ecology based on environmental economics to an ecology based on ecological economics. This ecology is also called environmental holism, which advocates that disciplinary and even scientific framework for planning emerging problems are narrow and make the search for solutions impossible.

The application of environmental holism to climate change is given by the possibility that environmental holism generates in the concerns of citizens in the knowledge of the processes of mitigation and adaptation to it, they are drivers of new intellectual developments and elevate this to new stages. Through environmental holism, the following challenges are presented to the problems of climate change studies:

• Analyze problems from a historical perspective in the search and implementation of response options: common but differentiated responsibilities. Equity.

• Guarantee that financing and technologies meet all the requirements of sustainable development.

• Need to develop capacities to face emergency situations of this nature from a holistic vision.

• Revalue the role of science: let it stop being the responsibility of a small group of specialists and also become the responsibility of the human community.

• Highlight the importance of local development, of developing response capabilities at a local scale.

• Need to enhance international cooperation/solidarity.

• Need to decisively incorporate the multi-criteria variable in the efficiency and effectiveness indicators of climate change.

• Take advantage of the opportunities and strengths of decarbonization.

A new economy

Economics is the science that studies the use of the scarce resources provided by nature to obtain goods and services that meet unlimited needs. Since their emergence, the terms scarce resources and unlimited needs have been distorted, leading to the belief that resources are not scarce and that needs are not unlimited, creating an economy based solely on market concepts. As long as we talk, think, or analyze only an economy that prioritizes the effectiveness of money above everything else, most emerging problems, including climate change, will continue to persist.

This makes it necessary to discuss the term from another perspective, envisioning a different economy, a different truth—one that is radically alternative, not merely about economic reforms. The other economy cannot be just economic; it must be comprehensive, ecological, intercultural, and dedicated to the well-being of all people and nature, contributing to the construction of human fulfillment. It is necessary to shift from economic growth as a goal to the full realization of sustainable development. It

is proposed to change the concept that companies have of productivity from the word's efficiency, efficacy and effectiveness to another that seeks at a personal, business and society level, ecosocioefficiency, ecosocioefficacy and ecosocialeffectiveness.

Table 1 shows the functions that some of these economies have to face the problems of climate change.

Table 1: Application of different economic thinking when analyzing climate change.

| TYPE OF ECONOMY | FUNCTION WITHIN THE STUDY OF CLIMATE CHANGE | LIMITATIONS |
|---|---|---|
| Traditional Economy | Guarantee the adequate flow of money from developed to underdeveloped countries to guarantee solving the problems of climate change. Take care of efficiency and effectiveness. | Mainly focused on the formation of prices and markets. The physical and human impacts of the economy are ignored. The functions of the biosphere and the community are not considered |
| Environmental Economics | Environmental accounting for climate change. Determination of the externalities that occur due to the effect of climate change. Economic assessment of the value of different ecosystems. | Market remains as the evaluation principle. Accepts neoclassical definitions of wealth, value and nature, thus addressing the environment and economics as a form of isolated research |
| Natural Resources Economics | Study the number of resources that must be extracted or harvested at present from an ecosystem and determination of their depletion period. | It conditions natural resources to economic growth. It accepts the principle that the polluter must pay, but it does not invest in pollution prevention. |
| Ecological economy | It is defined as the science of sustainability management or as the study and assessment of unsustainability. It is not a branch of economic theory but rather a transdisciplinary field of study, with a vision of the world as a thermodynamic and geodynamic system that is complex, forward-looking, and politicized. | Lack of knowledge about the instruments necessary for work and the limited awareness among officials about issues of sustainability, corporate social responsibility, and risk aversion. |
| Circular economy | Right production and consumption model (R's): Rethink, Reuse, Repair, Restore, Remanufacture, Reduce, Repurpose, Recycle and Recover. | Technological and financial challenges involved in changing and redesigning products. Dependence on demand and markets. Demand conditioned by the availability of markets for recycled products and materials. Risk of compromising the quality and safety of the products Possible transfer of environmental impacts. |
| Social economy | Set of actions carried out by companies, cooperatives that seek social transformation through collaborative work with voluntary and open adhesion; democratic management in economic participation of members and autonomy and independence | Danger of unfair competition by larger private or state companies. Their social objective is not clear to many. Lack of personnel to address environmental problems and technological improvements. |
| Economy of the common good | It is a model to build a solid social and economic system, aimed at developing an ethical and sustainable market economy trust, cooperation, appreciation, democracy, solidarity. | The main criticism is that it is idealistic, almost utopian, and it continues considering the market as a basis. |
| Knowledge economy | Set of activities that require an intensive contribution of human knowledge to generate value and offer society new products and services. | It requires significant investment in intangible capital, which includes resources such as human capital, intellectual property, technology, and accumulated knowledge. |
| Bioeconomy | Set of economic activities that obtain products and services, generating economic value, using resources of biological origin as fundamental elements, in an efficient and sustainable manner. | Some degree of incompatibilities with energy regulations in countries. Lack of capabilities in science and technology, innovation and human resources. |

Source: Own elaboration.

## CONCLUSIONS

The changes produced in science and technology over the last 70 years have triggered a revolution in knowledge that, although undeniably leading to progress, is simultaneously becoming a threat to life and nature itself, creating new types of problems—complex and multifaceted—that require a coordinated and effective response from the social actors involved to adequately address them. It is a challenge to solve these problems, demanding to unite the objectives of technoscience and the humanistic sciences in a way that achieves temporality and epistemic omni-objectivity. This involves considering complexity theory in decision-making, adopting a holistic approach when analyzing environmental problems, applying bioethics as a means to achieve the maximum wisdom, and introducing a different economy that fosters natural and social creativity as scientific horizons. An essential return of scientific concerns toward daily life, ethics, values, and virtues is needed, as exemplified in this work by applying these concepts to the problem of climate change.

## *REFERENCES*


Bravo Amarante, E., Schulz, R. K., Romero Romero, O., López Bastida, E. J., & Güereca, L. P. (2021). Análisis de decisiones multicriterio en la integración de herramientas de la economía ecológica. ***Universidad Y Sociedad, 13***(4), 468–477. https://rus.ucf.edu.cu/index.php/rus/article/view/2194

Cabrera, A. J. P., & José, A. (2004). Edgar Morin y el pensamiento de la complejidad. ***Revistas ciencias de la Educación, 1***(23), 239-253. https://filosofiageneral.wordpress.com/wp-content/uploads/2013/12/edgar-morin.pdf

Cardoso, A. L. L. (2023). HOLISMO AMBIENTAL: Ética da terra e ecologia profunda. ***Revista Instante***, ***5***(1), 146-166 https://revista.uepb.edu.br/revistainstante/article/view/1734

Ceberio, M. R. (2022). Desafiar, preguntar, reflexionar. Crear desorden en los conocimientos para crear nuevos conocimientos. Ajayu Órgano de Difusión Científica del Departamento de Psicología UCBSP, 20(2), 258-272. http://www.scielo.org.bo/scielo.php?pid=S2077-21612022000200258&script=sci_arttext

Delgado Díaz, C. (2019). Bioética y medio ambiente. Editorial Félix Varela. La Habana

Delgado, C. (2007). Hacia un nuevo saber. La bioética en la revolución contemporánea del saber. La Habana: Publicaciones Acuario.

Horwich, P. G. (Ed.). (2024). World changes: Thomas Kuhn and the nature of science. University of Pittsburgh Press.

Lee, H., Calvin, K., Dasgupta, D., Krinner, G., Mukherji, A., Thorne, P., ... & Park, Y. (2023). IPCC, 2023: Climate Change 2023: Synthesis Report, Summary for Policymakers. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland. https://doi.org/10.59327/IPCC/AR6-9789291691647.00

Liao, Y., Ramos, L. F. P., Saturno, M., Deschamps, F., Loures, E. D. F. R., & Szejka, A. L. (2017). The role of interoperability in the fourth industrial revolution era. ***IFAC-PapersOnLine, 50***(1), 12434-12439. https://doi.org/10.1016/j.ifacol.2017.08.1248

López Bastida, E J. (2014). ¿Bienestar en el siglo XXI?. Editorial Universo Sur.

López Bastida, E. J. (2020). Lecciones aprendidas y retos que nos está dejando la pandemia de COVID-19 desde la visión de la economía ecológica. ***Universidad Y Sociedad, 12***(3). https://rus.ucf.edu.cu/index.php/rus/article/view/1570

López Bastida, E. J., Aliyev, Z., & López, A. V. (2024). On the possibilities of Cuba-Azerbaijan cooperation to face emerging problems in the context of current global changes. International conference South Caucasus In The Context Of New Global Challenges May 3rd, 2024, 41. https://au.edu.az/userfiles/uploads/517f08cc736c6b4d2bf63e8f3afaf092.pdf#page=41

Luz Tortorella, G., Cauchick-Miguel, P. A., Li, W., Staines, J., & McFarlane, D. (2022). What does operational excellence mean in the Fourth Industrial Revolution era? I***nternational Journal of Production Research, 60***(9), 2901-2917 https://doi.org/10.1080/00207543.2021.1905903

Maidana, D., & Costanzo, V. (Eds.). (2013). Hacia otra economía. Universidad Nacional de General Sarmiento. http://core.cambeiro.com.ar/0-168166-9.pdf

Maldonado, C. E. (2023). Cinco tesis (y cinco conjeturas) acerca de la complejidad del origen y la naturaleza de la vida. ***Revista Iberoamericana de Complejidad y Ciencias Económicas, 1(***1), 37-52. http://104.154.220.201/ricce/article/view/104

Panel Intergurnametal de cambio climatica (IPPC) (2018) https://www.miteco.gob.es/es/ceneam/recursos/mini-portales-tematicos/cclimatico/informeipcc.html

Pathak, M., Slade, R., Pichs-Madruga, R., Ürge-Vorsatz, D., Shukla, R., & Skea, J. (2022). Climate Change 2022 Mitigation of Climate Change: Technical Summary. https://pure.iiasa.ac.at/id/eprint/19259/1/IPCC_AR6_WGIII_TechnicalSummary.pdf

Piñero, M. A. (2023). Transcomplejidad: Una Epistemología Emergente Orientada Al Desarrollo De Un Pensamiento Integrador. ***Miradas transcompleja, 3***(1). https://reditve.com/revistas/index.php/miradas_transcompleja/article/view/47

Potter, V. R. (2002). Bioética, la ciencia de la supervivencia. Selecciones de bioética, 1, 121-139. https://www.academia.edu/download/63994612/V._R._Potter_Bioetica__la_ciencia_de_la_supervivencia20200722-25903-15y3p1u.pdf

Sangucho, I. P. R. (2024). Reflexiones ético filosóficas sobre la ciencia y tecnociencia. ***Revista de filosofía, 41***(107), 162-171. https://dialnet.unirioja.es/servlet/articulo?codigo=9605525

Valdés López, A., López Bastida, E. J., & León González, J. L. (2020). Methodological approaches to deal with uncertainty in decision making processes. ***Universidad Y Sociedad***, ***12***(S1), 7–17. https://rus.ucf.edu.cu/index.php/rus/article/view/1745

World economic Forum. (2023) Global Rich report. https://www.weforum.org/publications/global-risks-report-2023/