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# General theory of ensuring environmental safety: state and directions for improvement

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**Abstract.** Progress in maintaining the ecological balance at the global, regional and local levels of human activity is inextricably linked with the continuous improvement of the general theory of environmental safety. The authors believe that new successes in further research can be expected in the use of the provisions of environmental safety in the economic sphere. It was also noted that the possibilities of the culturological approach make it possible to make a great contribution to ensuring environmental safety in various fields.

## 1. Introduction

The demand for GTES (General Theory of Environmental Safety) development in modern conditions is justified by the need to solve the problems of biosphere stability, ensuring its ecological and economic safety. The challenges posed by environmental threats must receive scientifically substantiated, well-reasoned answers with an assessment of the innovative technologies of the Fourth Industrial Revolution.

The direction "Ecology", a new section of which is environmental safety, is one of the priority national projects [1]. Environmental safety (ES) is an interdisciplinary science that includes natural, political, legal, philosophical, economic, social and cultural aspects, and the need for its impeccable provision is a necessary condition for the very possibility of the existence and sustainable development of civilization.

The relevance of political analysis of environmental theories, concepts, institutions related to the problems of environmental security in the modern world, are becoming an important prerequisite for rationalizing the process of political decision-making in the context of global development problems.

At the international level, there is a certain positive experience in resolving environmental safety issues by the United Nations and the European Union. Within the framework of these organizations, a search for a way out of the environmental crisis is underway, appropriate legislative decisions are made, commissions, subsidiary bodies and structures are created to monitor the implementation of the tasks in the field of ecology. An important role in the conceptual development of ways out of the environmental crisis and the formation of international environmental policy was played by the scientific research of the Club of Rome and the Stockholm Institute for Peace Research.

The issues of ecology and the formation of international environmental policy have acquired particular urgency, scientific significance and relevance in recent decades. This is due to the growing



importance of the environmental challenges themselves. Destruction, degradation, pollution of the environment is beginning to be realized by humanity. As a result, the environmental movement is expanding in many countries around the world. The concept of environmental safety has become a new concept, which implies a change in traditional approaches to environmental protection. Environmental safety cannot be achieved unilaterally. It requires a unifying relationship between countries. Since the first international conference on the environment (Stockholm), there has been a growing awareness of the importance of environmental issues. Subsequently, the Brundtland Commission showed that solving the ecological problems of our planet is the common task of mankind. With the creation of the United Nations Environment Program (UNEP), environmental issues have become an integral part of the work of the entire United Nations system.

Environmental security was initially included as one of the elements in the comprehensive system of international security. Gradually, it becomes one of the most important components of this system.

Since the 80s. XX century researchers are increasingly inclined to revise the definition of safety [8]. When studying the relationship between safety and environmental change, it is inevitable to conclude that environmental problems are threats to safety.

Security is social in its characteristics. However, in theory, analysts abstract from the understanding of security by various political associations, as well as from the real change in security in time [8].

At the moment, there is a theory that the concepts of "safety" and "environmental safety" are interconnected and they should be more precisely defined as a "threat to safety".

Consideration of environmental problems as threats is characteristic of both supporters and opponents of views on the relationship between environmental protection and environmental safety. But in general, the representatives of this concept believe that it is necessary to study security problems taking into account "high politics", political prioritization and funding. Although the theorists of the Copenhagen School of Security argue against such claims. From their point of view, security is associated with the defense of the state, which allows restraining illiberal emergency measures and suspending "normal politics" [8].

Ultimately, it is necessary to determine what matters in terms of how the problem of environmental security is viewed: as environmental problems or as climate change, or as security?

Threats are not a "threat" or "security" label. Rather, it is a way of understanding security itself combined with threats, which is only part of this broader security discourse. In particular, different security discourses - concepts of whose security matters more, from what threats, what sources of danger - have radically different consequences in terms of the methods they use. If the discourse is focused on national security, then this can contribute to mobilization and even military readiness for a military conflict associated with the consequences of environmental changes. If the discourse is focused on human security, mitigation strategies and a focus on the threats faced by vulnerable populations will be encouraged [7].

Taking into account the approaches available in research works in the characterization of environmental safety, it is necessary to pay attention to the underdeveloped aspect of the essence of environmental safety as a system. Environmental safety is inextricably linked with the cultural, political, economic and social policies of states. In this aspect, environmental safety acts as a social value, as a result of human cultural activities, as a product of humanity's understanding of the need to solve problem situations.

The laws of a market economy imply profit at any cost. The consequence is ecological trouble or a man-made disaster. Losses are compensated in case of environmental pollution. On the basis of this, a technocratic style of thinking is formed, for which it is important to immediately achieve the goal by any means. Therefore, GTES assumes to humanize scientific research and turn to a culturological approach.

GTES, based on the principles and rules developed taking into account the conditions of Industry 4.0, will allow finding a way out of their environmental crisis. This requires the development of the following directions.

First, to formulate environmental policy at the national and international levels, taking into account regional and global development. Secondly, to understand sustainable development as an ecological and economic responsibility to future generations of people. Thirdly, to expand the powers of the state in the field of managing the socio-ecological-economic system, to develop the ecological and economic culture of citizens. Fourth, to ensure the progress of society, a prerequisite for which is the optimal state of the environment and ecological balance. Fifth, to use the developed concepts for the purposes of predicting environmental safety and timely leveling the state of its threats. Sixth, study how the processes of globalization, glocalization, democratization and networkization create environmental threats. Seventh, to develop the achievements of environmental management, environmental marketing, environmental audit, considering them as one of the ways to solve environmental safety. Eighth, to study the dynamics of environmental movements, taking into account their politicized and non-politicized nature.

The following definition is legally enshrined: "environmental safety is the state of protection of the natural environment and vital interests of a person from the possible negative impact of economic and other activities, natural and man-made emergencies, and their consequences" [2].

Further progress in maintaining the ecological balance at the global, regional and local levels of human activity is inextricably linked with the continuous improvement of the general theory of environmental safety [3, 4]. This circumstance determines the relevance of the research undertaken in this direction.

## 2. Materials and methods

Today GTES includes 3 principles and 4 rules [5]. According to [3], the components of environmental safety are the protection of the population and territories from emergencies, radiation and fire safety. It also considers the environmental safety of construction production, transport systems, materials and industries.

Further progress in improving the GTES will provide a scientific and technical breakthrough in strengthening the national security of Russia.

The purpose of this work is to analyze promising ways of developing a general theory of ensuring environmental safety.

## 3. Results

The fundamental theory of biosphere stability is a subsystem of GTES.

The first principle of GTES is fundamental for maintaining the sustainability of the biosphere.

Consequently, the assertion that the nature of the homeostatic mechanism of biosphere stability is characterized by self-consistent preservation of balance in matter-energy and information interactions in its ecological systems can serve as the first principle of the fundamental theory of biosphere stability.

The second principle can be formulated as follows: the main condition ensuring the safety of the biosphere is to support its sustainability by maximizing the information of ecological systems.

An addition to the second principle of GTES is the following: the information field of the biosphere has a physicochemical meaning, which consists in displaying material and energy changes in the form of an information component of ecological systems.

Judging by the results of works [6], the greatest successes have so far been achieved in information, economic and cultural modernization of GTES.

The new formulation of the first GTES principle states that the level of environmental and economic security is limited by the time and scale of the impact: with a short-term impact, it can be relatively safe, and with a long-term impact, it can be dangerous, a local change is almost harmless, and with a large-scale change, it can be catastrophic.

The level of ecological and economic security is determined by the quality of the territory's ecosystems and the intensity of their change under anthropogenic influence.

It is argued that according to the second principle of HSE, a socio-ecological-economic system of any rank "is a conjugation of qualitative and quantitative sets of matter, energy and information, which are in continuous change due to changes in environmental parameters (N.F. Reimers, Yu. N. Kurazhkovsky, L. V. Bobukh, K. A. Bobukh, L. P. Milesenko)".

In addition to the second and third principles of GTES, the following provision was formulated: maintaining the ecological balance in material-energy and information interactions in socio-ecological-economic systems of all levels should be carried out by maximizing economic information for the development of highly effective management decisions.

#### 4. Discussion

An information supplement to the second principle of GTES can be formulated as follows: the information component of the environment has a physicochemical meaning, which consists in displaying material and energy changes in the form of an information environment (information field) of all subsystems [6,7].

In the article "Physicochemical foundations of ensuring environmental safety" we laid the scientific direction "Physicochemical foundations of ensuring environmental safety", which is designed to solve the problem of minimizing environmental pollution. The development of this direction was reflected, for example, in work [3], which proposes a method for assessing the environmental safety of electrolyte compositions, which can be used for environmental expertise at the design stage of electrochemical plants.

The problem of preserving forest resources is a global environmental problem of our time. The culturological approach is an effective means of solving urgent problems of ensuring environmental safety in all areas of life. From this point of view, an analysis of the understanding of Russian writers about the problem of forest conservation in Russia was carried out.

#### 5. Conclusion

Progress in maintaining the ecological balance at the global, regional and local levels of human activity is inextricably linked with the continuous improvement of the general theory of environmental safety.

However, we are clearly seeing major changes in dominant security beliefs and practices over time. Starting with defining sovereignty as the responsibility to support the nuclear disarmament process. This should serve as a reminder that change can and does occur, and advocates of environmental safety can, with caution, believe in the adoption of such principles. However, controversy arises around anthropocentric and global theories, at the same time there is an orientation of the majority of civil society towards general mobilization.

And if we link climate change and security, then the seriousness of the challenge posed by climate change forces us to take a fresh look at what environmental security means and how it can be realized. The authors believe that new successes in further research can be expected in the use of the provisions of environmental safety in the economic sphere.

It was also noted that the possibilities of the culturological approach make it possible to make a great contribution to ensuring environmental safety in various fields.

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