**International Scientific Conference „Natural Disasters in the 21st Century: Monitoring, Prevention, Mitigation“**
**Proceedings, ISBN 978-9941-491-52-8, Tbilisi, Georgia, December 20-22, 2021**

# ON THE DEVELOPMENT OF A DICTIONARY-REFERENCE BOOK OF TERMS AND DEFINITIONS OF THE FUNDAMENTALS OF ECOLOGY

**Gunia G.**
*Institute of Hydrometeorology of Georgian Technical University, Tbilisi, Georgia*
*garrygunia@yahoo.com*

***Summary:*** *The modern process of development of ecology as a science dictates the need for a comprehensive study of the laws of interaction between the natural environment and human society, as well as the Ecologization of teaching a number of scientific disciplines. This will largely be facilitated by the development of a Georgian-language dictionary of unified terms and definitions of the fundamentals of Ecology, which will be useful for improving the process of teaching and learning the fundamentals of Ecology. With this aim, the first attempt to develop such kind dictionary-reference book is in progress and close to finalization at the Institute of Hydrometeorology of the GTU.*

***Key words****: ecological education, dictionary-reference book.*

## Introduction.

Recently, a number of academic disciplines have appeared in higher educational institutions, such as, for example, "Chemical Ecology", "Engineering Ecology", "Construction Ecology", etc. Analysis of the content of these new disciplines shows that they often only touch on certain aspects of the environment protection and nature management, while the whole content is far from the discipline of Ecology. Therefore, we believe that we should be more careful when applying the term "Ecology" and its derivatives. Otherwise, there is a conditional terminological substitution, which generally prevents the formation of Ecology as an educational discipline. In our view, any terminological substitution leads to chaos in the study of the most complex process of interaction between society and nature. Therefore, we consider inadmissible the incorrect use of the term "Ecology" and its derivatives. The elaboration of the "Dictionary-Reference Book of the Terms and Definitions of the Fundamentals of Ecology" will significantly help to eliminate these shortcomings.

## Term "Ecology"

Nowadays, the term "Ecology" has many meanings [1], and is used to denote the science that studies:

- The organization and functioning of various levels of superorganisms, including: systems, populations, species, biogeocenoses, ecosystems and the biosphere as a whole;
- Joint development of people, human families as a whole and the natural environment;
- Ways to overcome the global environmental crisis.

Basic theoretical conceptions of ecology - ecosystem, population, ecological niche, relationships of organisms within population, family, ecosystems - were developed in the first half of the XX century. The studies of human impact on populations and ecosystems were developed in the second half of the XX century. During this period, people's attitudes towards the dangers of the ecological crisis have been significantly increased due to the following reasons: unregulated population growth, progressive environmental pollution, depletion of mineral and fossil energy resources, reduction of biodiversity, soil degradation and development of global biosphere processes, strengthening of greenhouse effects and ozone depletion. Thus, ecology - the science of the life of nature - experiences the second life.

Formulated more than 100 years ago as the doctrine of the relationship between the organism and the environment, we have witnessed the transformation of ecology into a science about the structure of nature, science of how the biosphere the earth as a whole work. Individual properties of the environment or

its elements are called factors, while environmental factors that act on living organisms are called ecological factors. Their diversity is divided into two major groups - abiotic and biotic (Table 1) [2].

Table 1. Classification of ecological factors.

| Ecological factors | |
|---|---|
| Abiotic | Biotic |
| Light, temperature, humidity, wind, air, | Influence of plants on other members of |
| Mechanical composition of soil, its penetration, | Influence of animals on other members of the |
| Content of nutrients in soil or water, gaseous | Anthropogenic factors caused by human activity |

Since the development of the living world is increasingly driven by human activity, highly progressive scientists see the future of ecology in the theory of the creation of a transformed world. Nowadaus,Ecology takes the form of a theoretical basis of behavior of a human, who is a representative of industrial society, in the natural environment.

**Ecological Load of the Environment.**

One of the most important problems of modernity is the protection of the natural environment from the results of the ecological load caused by anthropogenic influences. According to many estimates, this negative impact is assuming dangerous proportions; therefore, it is necessary to develop programs for the effective management of the ecological state of the environment. The development of these programs requires a lot of information about the research, assessment and forecasting of a given situation. At the same time, we consider the Earth as a global system of life activity and we study all possible options for managing this system. The solution to modern ecological problems is related to: processes of economic development, population growth, and the fight against poverty.

The problems of preventing an ecological catastrophe and achieving sustainable development in their scale outweigh all the problems that humanity has faced in the process of its development. Never before has there been such a huge gap between the scale of the problem and our ability to solve it.

It is known that the atmosphere and hydrosphere are the main routes for the circulation of substances in the natural environment, while the transfer of harmful substances into the environment is conditioned by hydrometeorological processes. Therefore, it is necessary to perform the monitoring, forecasting and management of the environmental load caused by anthropogenic impacts by considering the principles of hydrometeorological processes [1].

At present, it is difficult to imagine a large industrial area or city that does not take measures to protect the environment. Already nobody doubts anymore, that ecological monitoring of the natural environment - regular, long-term observations in time and space of the state of the natural environment and the phenomena occurring in it, as well as assessment and forecast of the state of the natural environment - is one of the main integral parts of an organized human life. At the same time, in the monitoring process, it is of great importance to register meteorological conditions, which have a significant impact on the speed and direction of air mass transfer. Because of this, the concentration, nature and behavior of impurities do not remain the same. Their integral characteristics in the atmospheric column and their geographical distribution in the environment also change significantly.

As it is stated in the monographs [1, 2], ecological monitoring is carried out in a complex way. It is carried out through the elaboration of scientific-research and practical issues in various fields.

In addition, it should be noted, that the solution of issues related to the ecological problems of global climate change, including desertification requires the attention of a wide range of environmental scientists. The latter process under extreme conditions can lead to a complete disruption of a biosphere and desertification, as a result of fluctuations in the restorative properties of the ecosystem.

In the beginning of the XXI century, the area of anthropogenic deserts ranges from 10 to 13 million $km^2$, and not less than 30 million $km^2$ of lands are at risk of desertification. As a result, the mass productivity of the planet has decreased by 1/3 compared to the previous period.

Table 2 shows the coefficients of anthropogenic load and the share of surviving natural areas, calculated for various countries [4].

Table 2. The coefficient of anthropogenic load and share of surviving natural areas in %

| Country | Coefficient of anthropogenic | Share of natural areas,% |
|---|---|---|
| Netherlands | 42 | 0 |
| Germany | 19 | 0 |
| Japan | 16 | 0 |
| USA | 3.4 | 4 |
| The Republic of Korea | 4 | 0 |
| Mexico | 1.2 | 2 |
| China | 1.1 | 20 |
| India | 1 | 1 |
| Russia | 0.7 | 45 |
| Canada | 0.4 | 65 |
| Brasil | 0.2 | 28 |
| Algeria | 0.2 | 64 |
| Australia | 0.2 | 33 |
| The whole earth | 1 | 39 |

Anthropogenic load ratios are obtained as a ratio of the energy capacity coming per unit area of the country to the average global energy capacity coming per unit area. As the table shows, on average, the territory of Europe is experiencing the greatest anthropogenic load, while the share of protected natural areas in the world is only 39%. If we take into account the process of uncontrolled human population growth - we are not far from the catastrophic decline of natural areas. Despite the fact that humans as a biological species, in terms of its biomass, make up one thousandth of a percent of the living matter of the planet, they produce several thousand times more waste than the entire biosphere of our planet. At the same time, they double every 15 years. As a result of the impact of these exponentially growing flows of household and industrial waste, historically established natural cycles and evolutionarily formed biogenic flows of various substances are seriously disturbed.

In addition to global effects, a number of negative effects of regional factors are often observed. For example, the environmental consequences of the construction and operation of power plants are primarily related to: the adverse impact of reservoirs on the microclimate of the surrounding area, hydrological regime, exclusion of large areas and flooding of fertile lands and forests, deterioration of the state of flora and fauna, etc. As a result, the loss of lowland biotopes in the plains is partially compensated, while in the mountains this loss remains largely irreplaceable. Because of this, the destructive impact of mountain reservoirs on the ecosystems of adjacent territories is extremely pronounced.

According to the performed assessments, this problem is multifaceted and severe in Georgia. Therefore, when assessing the energy efficiency of energy systems (in particular, hydroelectric power plants) required for the country's development, it is crucial to consider the consequences of the environmental impact of these systems on the natural and social environments [2]. Due to the obvious direct manifestations of their negative effects on the state of the natural environment, such elements constituting an environmental hazard as smog and acid rain come to the attention of the public. Attention to these factors of environmental strain is growing in the world. Acid rainfall monitoring programs have been developed in many countries. Nowadays, the problems of climate change and technogenic load on the environment represent not only a scientific, but also an economic and political problem. Any mistakes made in dynamics of the specified phenomena are carriers of the serious economic failures. Vivid example of this are the mistakes made in 50-60-s' years of the XX century in forecasting the decrease of the level of Caspian Sea by 2000. This mistake has resulted in a social and economic tragedy for this big region. Now, the price of

mistakes is much higher. For a number of countries expected climatic change is not only a geopolitical question, but represents an issue of rescuing humanity.

**Ways to Successfully Solve the Problem.**

Successful solution of the problem under consideration requires a complex approach, which is possible in the presence of a wide range of appropriately trained specialists. For this, first of all, it is necessary to indicate the availability of methodological manuals of uniform environmental terms and definitions corresponding to local conditions. It should be noted that in Georgia the full extent of this situation, its immediate and distant consequences are not fully realized. Moreover, this issue is still completely not studied and requires serious processing. In recent decades, there are broad changes in the content of education. The Ecology as a science is expanding and deepened. The awareness about the need to tackle the problems of human survival in the technosphere is increased. At the same time, the Ecologization of academic disciplines, the laws of the relationship between nature and society, natural - scientific, humanitarian, technical and technological areas dictate the need for comprehensive study. The future specialists should be familiar with issues such as: assessment of the condition, sustainability and development of territorial - natural and agricultural - natural complexes, ecological monitoring, management in the system of nature protection and consumption of natural resources, development of recommendations for the preservation of the natural environment, etc. Thus, solving the above issues, including: the transfer of harmful impurities in the natural environment, monitoring, forecasting, management of these processes, as well as obtaining adequate education in the required volume is difficult without a dictionary - reference book of unified terms and definitions adopted in Meteorology and Ecology. Nowadays, some traditional terms are often given new meanings, while definitions of a number of other terms and concepts can only be found in scientific literature, which often remains inaccessible to a wide range of population. The dictionary - reference book should contain: basic uniform terms adopted in Ecology; definitions of concepts and important reference material for different areas of fundamental and applied ecology, including geophysics and hydrometeorology. The dictionary-reference book should be intended as a manual for students of any specialty, whose education is related to various areas of ecology.

**Conclusion.**

The elaboration of a Georgian-language dictionary - reference book of the main unified terms adopted in Ecology will make a significant contribution to the sustainable and safe development of the country's economy and thereby it acquires the character of a state importance. Its elaboration and dissemination by print and electronic means will be useful for improving the processes of teaching and learning the basics of Ecology in Georgian higher educational institutions. The dictionary - reference book will also contribute to the successful implementation of the laws of Georgia in the field of Environmental protection and tackling the ecological issues of the country. The dictionary - reference book will also contribute to the successful implementation of the laws of Georgia in the field of Environmental protection and tackling the ecological issues of the country.

**References**


1. Gunia G.S. Questions of monitoring of atmospheric air pollution on the territory of Georgia. // L.: Gidrometeoizdat, 1985, 85 p.
2. Gunia G. Meteorological aspects of ecological monitoring of the atmosphere. // Tbilisi, Georgian Academy of Sciences, Institute of Gydrometeorology, 2005, 265 p.
3. United Nations Convention to Combat Desertification. // UNCCD, 1996.
4. Kotlyakov V.M., Losev K.S., Suetova I.A. Energy investment in a territory as an environmental indicator. // Izv. RAN Ser. Geogr., 1995. No. 3, pp.70-75.