

Environmental Determinants of Sustainable Development*

Marina L. Ivleva

Peoples' Friendship University of Russia
b. 6, Miklukho-Maklaya str., Moscow, Russia 117198
E-mail: ivleva-ml@rudn.ru

Vitaly Yu. Ivlev

National Research University
Bauman Moscow State Technical University (BMSTU)
2-ya Baumanskaya, 5-1, Moscow, Russian Federation
105005
E-mail: vitalijivlev@yandex.ru

Vladimir Inozemtsev

National Research University
Bauman Moscow State Technical University (BMSTU)
2-ya Baumanskaya, 5-1, Moscow, Russian Federation
105005
E-mail: inozem_63@mail.ru

Nonna Bagramiants

Department of Human Resources
Sportmaster
Moscow, Russia
E-mail: nonnalev@yandex.ru

Abstract—The work provides a socio-philosophical analysis of the most significant environmental determinants of sustainable development. The article identifies two main groups as environmental determinants of sustainable development. The first group of determinants is formed by environmental determinants of sustainable development in themselves, which emerge as a result of solving a number of separate environmental problems. The second group consists of determinants which are interconnected with environmental determinants of sustainable development and arising on the way of solving a number of separate global problems of modern age, which are closely connected and intertwined with environmental issues.

Keywords—*global problems; environmental issues; environmental determinants of sustainable development; modern technogenic civilization*

I. INTRODUCTION

The main contradictions of the technogenic civilization are focused in the global problems of modern age, which have arisen as a result of the integration processes in the entire world community that covered all kinds of spheres of people's life. The most profound and acute of these problems are: environmental problems; the problem of peacekeeping and preventing nuclear war; problems of space and World Ocean exploration; food problems; demographic problems; problems of overcoming the backwardness and poverty of developing countries; energy and raw material problems; climate problems [1]. As features of global problems, the following should be noted: the global nature of these

problems; they pose a threat to the existence of mankind; they require urgent and effective solutions and involving all states and combining the efforts of all nations to solve them [2].

Modern technogenic civilization is currently on the verge of a dangerous future. The rapid growth of the anthropogenic load on the biosphere is already close to a critical state, when the very existence of mankind as a biological species is endangered. At that, the explosion of the ecological system due to overload may occur quite unexpectedly. Modern technogenic civilization significantly weakens the effect of self-preservation of life, as evidenced by the rapid destruction of the ecosystem and natural communities of organisms. Natural resources are irrecoverably depleted, leaving future generations without energy reserves. Riding the wave of technological revolutions in the century of ongoing scientific discoveries, humanity in a ruthless manner systematically destroys the foundation of its life support. The ecological crisis is associated with a spiritual one, the way out of which lies on the path of sustainable development and the formation of the ecological paradigm of social consciousness. [3] [4].

On this background, environmental issues get a planetary scale, becoming one of the central problems in the set of global ones of the modern world. The environmental component in the course of the transformation of a technogenic civilization towards sustainable development includes several interrelated key determinants, which are the solution to the relevant problems – both environmental and associated with them resource, food, demographic and other problems. Next, we consider the most significant of these environmental determinants that affect and will influence the development of technogenic civilization in the direction of sustainable development. Solving a set of environmental

*The study was carried out with the financial support of the Russian Foundation for Basic Research (RFBR) in the framework of the scientific research project ("Environmental Paradigm in Public Consciousness: Formation and Development"), project No. 18-013-00488

problems will lead to the attainment of a long-awaited ecological balance for the inhabitants of the Earth – the foundation of a new technogenic civilization of sustainable type.

II. ENVIRONMENTAL DETERMINANTS OF SUSTAINABLE DEVELOPMENT IN THEMSELVES

Two main groups can be distinguished as ecological and interrelated determinants of sustainable development. The first group of determinants is formed by environmental determinants of sustainable development in themselves, which emerge as a result of solving a number of separate environmental problems. These include: overcoming the technocratic approach to solving environmental problems; solving the problem of regulation and establishment of environmental standards; the solution of the environmental problem of radioactive contamination; solving the problem of limited and uneven distribution of freshwater resources and increasing systematic water pollution; solving the problem of rational use of the resources of the World Ocean.

The second group consists of determinants which are interconnected with environmental determinants of sustainable development and arising on the way of solving a number of separate global problems of modern age, which are closely connected and intertwined with environmental issues. Among such global problems with an ecological vector, the following problems can be distinguished: global energy and raw materials problem; the demographic problem of optimizing population growth; the socio-economic problem of the gap of consumption levels in developed and developing countries; problem of food security of modern civilization.

Consider the first group of determinants of sustainable development – environmental determinants in themselves. Overcoming the technocratic approach to solving environmental issues is the first environmental determinant of sustainable development. Technocratism in solving environmental problems, the most complex global problems of modern age, demonstrates its one-sidedness and limitations.

The development concept proposed by the Club of Rome as early as in the 1970s focused on the development of waste-free, resource-saving technologies, on the enhanced control of international organizations over the state of the natural environment and its use. Solving the environmental issues in this way is dictated primarily by a technocratic approach to their solution.

To get out of the current environmental crisis, it is necessary to restore coherence between technology and culture, to remove environmental issues from the technocratic realm and to connect the humanitarian aspect to its solution, it is necessary to form an ecological paradigm of public consciousness [5] [6].

The purpose of the further evolution of humanity should be the spiritual development and the shift of priorities from the development of technology to the development of human consciousness; in this case it will be possible to talk about

the restoration of the lost ecological balance. It is probably not by chance that the breathtaking rise of scientific and technical thought in the 20th century coincided with the suppression of the sphere of life itself. It was precisely as a result of irresponsible and uncontrolled technical progress that the ecological crisis became possible [7].

The second actually ecological determinant of sustainable development is the solution to the problem of regulation and the establishment of environmental standards. For control over environmental and economic programs, a fierce struggle has now evolved between various political and economic forces represented, in particular, by transnational corporations (TNCs), which have the greatest responsibility for environmental pollution. The goal of the struggle for influence on the regulation and establishment of environmental standards is the control and distribution of the planet's natural resources: control over air, water and land.

Ecologists and the international community are particularly concerned that the broad masses of the population have practically no access to decision-making on issues of vital importance for the protection and distribution of natural resources. A new institutionalized bureaucratic supranational system is being born, claiming for global control in the nature environment being protected. Newborn global (supranational) management can be a new wave of colonialism, because commercial interest begins to hide more and more under the guise of ecology. The problem of the ecological crisis has also received a social superstructure, when natural resources falling within the sphere of market interests are specifically included in it; and the problem of social bonds and relationships is reduced to market transactions and falls into the sphere of private interests, and the concepts of solidarity and social justice become anachronisms [8].

The next third actually ecological determinant of sustainable development is the solution of the environmental problem of radioactive contamination resulting from the development of atomic energy and nuclear weapon tests. The accident at the Chernobyl nuclear power plant divided the world into two camps: the supporters of the further development of the nuclear power industry and its opponents. The recent catastrophe in Japan has further polarized the world. The leading countries of Europe immediately held referendums, as a result of which, for example, in Germany, it was decided to close all old nuclear power plants (NPPs) by 2020. In Italy, two environmental questions were laid upon the referendum: the question of the privatization of drinking water as a national resource and the question of returning to the use of NPPs (since so far in Italy a general vote was imposed on banning the construction of NPPs). Thus, the civilized world is looking for ways to solve environmental problems.

The elimination of NPPs and the termination of the construction of new ones will not solve the power generation issue. NPPs in many countries are practically the only source of power generation in sufficient quantities for humanity. The IAEA states that there is no reason to be afraid of thermonuclear fusion, this power generation method is

environmentally acceptable, safe and economical. However, a ban on the use of nuclear energy will not solve environmental problems. It is necessary to use technical and technological advances correctly and ensure maximum safety. In this case, NPPs of the new model will be able to supply human life with the necessary amount of energy in the future.

As the fifth actually ecological determinants of sustainable development, we will highlight the solution to the problem of rational use of the World Ocean resources. Most (71%) of the Earth's surface is occupied by the World Ocean. It delivers almost half of the air oxygen to humanity and supplies people with protein food. Sea water generates heat, provides circulation of currents and creates atmospheric flows, determining the weather and climate on Earth. The oceans are a source of enormous reserves of biological resources (fish, zoo- and phytoplankton). In addition, the ocean is a potential energy generator that mankind has not yet learned to use (the energy of one tidal cycle of the oceans is able to provide energy for all of humanity).

Although the production of desalinated water is still underdeveloped, it is expected that in the near future the ocean will become the main source of drinking water. The main biological resource of the ocean is fish, but its reserves are not commensurate with the growth rates of catches, and most importantly with the damage caused to the ocean by a man destroying its living world. In this regard, mankind seriously needs to understand that the biological resources of the ocean are threatened by an ecological catastrophe as a result of excessive and uncontrolled exploitation, and that careful attitude and rational use of ocean resources is a global problem today.

III. DETERMINANTS OF SUSTAINABLE DEVELOPMENT INTERRELATED TO ENVIRONMENTAL ONES

The second group consists of determinants which are interconnected with environmental determinants of sustainable development and arising on the way of solving a number of separate global problems of modern age, which are closely connected and intertwined with environmental issues. The first determinant from this second group of determinants of sustainable development is connected with the solution of the energy and raw materials problem, which is responsible for providing energy sustainability in the development of modern technogenic civilization.

Over the past century, mankind has extracted more minerals from the depths of the planet than during the entire previous history. The extremely uneven distribution of natural resources on the planet is explained by various climatic and tectonic processes that took place in past geological epochs on the Earth, creating different conditions for the formation of mineral resources. Until the end of the 19th century, wood and coal were the main energy resources for humans; then they were replaced by oil and gas. Energy production in the last century has doubled every 15 years.

World fuel reserves are primarily coal (60%), gas and oil (27%) ones. The total world production is distributed in a different way: 30% of production refers to coal, while the

share of oil and gas accounts for over 67%. It is necessary to consider the finiteness of natural resources. The urgency of the problem is further aggravated by the fact that the increasing resources production rate results in environmental problems as well.

The next determinant of the second group of determinants of sustainable development, interconnected with environmental issues, is focused on solving demographic problems.

Demographic problems include not only the problem of population growth, but also the problems of nature management, which were discussed above, the control over population growth in proportions to populated areas, its natural resource base (factors of demographic pressure, state and quality of the environment, ethnic ratios and others). All this makes the mentioned demographic problem an environmental issue. Currently, there are two main reasons for overpopulation: 1) excessive pressure of population density per unit of territory, 2) insufficiently high level of productive forces development. The second reason prevails. Most of the world's population (60%) is concentrated in Asia. The main population growth (more than 90%) comes from developing countries, and this trend will continue for many years.

In developed countries, the standard of living and level of culture is much higher, and therefore the expenses for the care of children, including education and medical care, is much higher for the average family in these countries than in developing ones. In addition, the level of culture imposes a greater responsibility on parents to children in developed countries. All of this, ultimately, leads to small-size families and to a birth-rate falling in developed countries.

Currently, the planet overpopulation problem is so urgent that it has received the status of a global problem and has become one of the factors threatening the survival of civilization. Population growth rates in the developed countries of the northern hemisphere and in the developing countries of the South are proportional to each other in the ratio of 5% to 95%. This growth in developed countries is mainly due to a decrease in mortality and an increase in life expectancy, but this level is no longer enough even to ensure simple reproduction of the population. But the growth of the population in developing countries is so irrepressible and uncontrolled that it represents the most important socio-economic and demographic problem of global significance, the so-called population "explosion".

By the beginning of the 21st century, the majority of the population, almost 75%, is concentrated in the inhabited and developed territories, constituting only 8% of their total number, where habitat and economic conditions are favorable. This creates a strong population pressure on the territory, especially when economic activity has been conducted on them for thousands of years. Neither the nature of the technologies used, the level of consumption or waste, nor the extent of poverty or inequality affect the environment in the same way as population growth. The greater the population, the greater the pressure on the territory, and hence on the environment.

The progressive development of engineering and technology, transport collapses, the need to search for new reserves of natural resources "squeeze" people into little-inhabited or completely unexplored areas of extreme natural living conditions (taiga, tundra and others). They are rather fragile ecological systems that are unstable at elevated loads, which leads to the increasing destruction of the natural environment in these areas. Due to the fact that the ecosystem is a single living organism, an imbalance of the world natural environment occurs, causing global environmental stress. Demographic problems complicate not only the ecological or food situation, but also inhibit the development process itself.

One of the components of the demographic perspective is the urbanization of the modern world. It is assumed that by the middle of the new century half of the Earth inhabitants will live in cities. The population of the developed countries in which the largest megacities and agglomerations are concentrated today consists of urban residents by 80%. Due to the increased concentration of industry and road transport in cities, there is an additional pressure on the ecological environment, and an urban crisis arises, primarily due to the tremendous problem of resource consumption. Thus, the contradictory tendencies of the urbanization process at the beginning of the 21st century fit organically into the complex of global problems, including environmental ones.

The third determinant of the second group of determinants of sustainable development is the solution of the socio-economic problem of the gap in consumption levels in developed and developing countries.

This determinant manifests itself as a social parameter in the system of environmental issues. At present, a huge gap in consumption levels in various regions of the Earth, which has emerged as early as in the industrial era, continues to exist. If for a relatively small part of humanity that lives in developed countries, all the benefits of overconsumption are provided, then the rest of the world's population lives on almost the verge of poverty, and more than 800 million people are starving.

The emergence of the "third world" phenomenon is primarily due to the escalation of the socio-ecological situation in developing countries, the main differences of which are the natural originality of the tropical zone and the traditional orientation of development. It is the very thing that creates even more pressure on the biosphere due to the rapid population growth, the traditional specifics of agriculture, and direct dependence on the former metropolitan countries.

The specificity of environmental problems in industrial developed countries is "industrial in nature", that is, pollution comes from development, from the "wealth" of countries. Developing countries create environmental problems due to the enormous pressure on the ecosystem, due to over-use of natural resources (forests, soil and other natural resources that are depleted uncontrollably), that is, ultimately, due to poverty. In this natural resources' usage mode, the distribution of responsibility for environmental pollution should be proportional to the countries'

development level. Economically developed countries should take on the strategic leading role of organizing, financing and controlling global actions to prevent environmental catastrophe, recognize responsibility for the problems of ozone holes, the greenhouse effect and other problems. The world community should develop a clear policy based on trade-off decisions related to controlling the load on the ecosphere both from highly developed countries and from third world countries to which an appropriate assistance need to be given in developing a plan for the use of natural resources [9].

As the fourth determinant of the second group, we highlight the solution to the problem of food security of a modern technogenic civilization. The food problem is global in nature, has long historical roots and will accompany humanity throughout its existence. The humanistic significance of the food problem refers it to the category of social problems of today due to its connection with the tasks of overcoming the socio-economic imbalance between developing and developed countries, but in fact this problem is also an ecological one. Man as an element of nature has the first and necessary vital need – the satisfaction of hunger. The lack of food supply to a significant part of the population in developing countries not only hinders progress, but also creates social and political instability in these countries [10]. Polarization of food production and distribution, its direct dependence on the level of a country's development leads to the emergence of a problem close to it: in some countries, people are forced to suffer from hunger, and in others to fight either excess food products or their excessive consumption.

The food problem cannot be solved one-dimensionally from the standpoint of agriculture in isolation from demographic, energy and environmental problems. Its solution depends not only on the increase in food production, but also on the development of a strategy for rational use of food resources, the basis of which should be a rational planning of human nutritional needs, its quantitative and qualitative aspects. In general, in the world, global agricultural resources and technologies are quite sufficient to supply satisfactory nutrition to all of humanity. The world economy is able to produce twice as much food as is necessary for the life of all mankind. The problem arises from the unevenness of food production; the food is not supplied for people where they mostly need it, and these are 20% of the inhabitants of the planet who are starving and undernourished. In this aspect, the food problem becomes a social factor of the food crisis.

The food situation in the world depends on many parameters: on the physiographic conditions and the location of the population, on the development of world transport and the growth of world trade. The food situation in developing countries is undoubtedly dependent on other global problems – social, economic, energy, but we are interested in one important aspect of the food problem – environmental: hunger as a problem of human survival, and while it exists, the food problem will be one of the most pressing factors of environmental issue.

IV. CONCLUSION

Thus, among the global problems of modern age, the problems of the ecological format come to the fore, in solving which the attention of the world community should be focused not on relations between nations, but on relations between man and nature. The most important task should be the development of a new policy of attitude to nature, the development of a new environmental consciousness, a change of priorities in environmental protection and concepts of safety and global threat [11] [12]. All the environmental problems discussed above are still being solved separately. Preventing environmental catastrophe, mankind should maximize its thrift strategy in relation to the world around it, involve all members of the world community in this process, create a supranational structure of strict control and maximum loyalty to thrift and self-preservation tasks.

It is necessary for mankind to conduct a complete reorientation on new thinking, on the development of ecological consciousness [13] [14]. Moving along the path to the sphere of mind – the noospheric consciousness – a fundamentally new approach to education, science and technology should be developed in the system of an evolved strategy of sustainable development as a transitional stage to the noosphere [15]. Only if a person is aware of himself as an integral part of nature included in the ecosphere, the solution of environmental problems will become a natural and necessary condition for human survival.

REFERENCES

- [1] N.N. Gubanov and N.I. Gubanov, Mental Responses to Risks in Modern Society, Proceedings of the International Conference on Contemporary Education, Social Sciences and Ecological Studies (CESSSES 2018). Series "Advances in Social Science, Education and Humanities Research", 2018, vol. 283, pp. 1003–1007. DOI: 10.2991/cesses-18.2018.220
- [2] N.N. Gubanov and N.I. Gubanov, Mental Bases of Social Solidarity, Proceedings of the International Conference on Contemporary Education, Social Sciences and Ecological Studies (CESSSES 2018). Series "Advances in Social Science, Education and Humanities Research", 2018, vol. 283, pp. 998–1002. DOI: 10.2991/cesses-18.2018.219
- [3] V.Yu. Ivlev, M.L. Ivleva, V.A. Inozemtsev, Krizis tekhnogennoy tsivilizatsii i formirovaniye novoy ekologicheskoy paradigmy obshchestvennogo soznaniya v usloviyakh informatsionnogo obshchestva [The crisis of technogenic civilization and the formation of a new ecological paradigm of public consciousness in the conditions of the information society], *Izvestiya MGTU MAMI*, 2013, vol. 2, no. 4(18), pp. 50–57.
- [4] V.A. Inozemtsev, Stanovleniye ekologicheskoy paradigmy myshleniya kak preodoleniye krizisa tekhnogennoy tsivilizatsii [Formation of the ecological paradigm of thinking as overcoming the crisis of technogenic civilization], *Psikhologicheskaya adaptatsiya i psikhologicheskoye zdorov'ye cheloveka v oslozhnennykh usloviyakh zhiznennoy sredy* [Psychological adaptation and psychological health of a person in complicated conditions of the living environment], Moscow, 2013, pp. 504–515.
- [5] M.L. Ivleva, V.A. Inozemtsev, Formirovaniye i razvitiye ekologicheskoy paradigmy obshchestvennogo soznaniya [Formation and development of the ecological paradigm of public consciousness], Proceedings of the 17th International Scientific Conference "Sakharovskiy chteniye 2017 goda: ekologicheskoye problemy XXI veka" [Sakharov readings 2017: environmental problems of the XXI century], Minsk, Belarusian State University, 2017, pp. 60–61.
- [6] N.D. Lepskaya, V.A. Inozemtsev, Spetsifika kul'tury tekhnogennoy tsivilizatsii v kontekste global'nykh problem sovremennosti [The specifics of the culture of technogenic civilization in the context of global problems of modern age], *Chelovek, obshchestvo, istoriya, yazyk, kul'tura v sovremennom nauchnom rassmotrenii* [Man, society, history, language, culture in modern scientific examination], Moscow, Moscow Polytechnic University, 2018, pp. 52–65.
- [7] M.B. Oseledchik, V.Yu. Ivlev, M.L. Ivleva, Knowledge as a non-equilibrium dynamic system, Proceedings of the 2nd International Conference on Contemporary Education, Social Sciences and Humanities (ICCESSH2017). Series "Advances in Social Science, Education and Humanities Research", 2017, vol. 124, pp. 1–5. DOI: 10.2991/iccessh-17.2017.1
- [8] M.B. Oseledchik, M.L. Ivleva, V.Yu. Ivlev, Using Social Networks in Knowledge Management System, Proceedings of the 2nd International Conference on Culture, Education and Economic Development of Modern Society (ICCESE 2018). Series "Advances in Social Science, Education and Humanities Research", 2018, vol. 205, pp. 911–914. DOI: 10.2991/iccese-18.2018.208
- [9] Vitaly Yu. Ivlev, Marina I.Ivleva, Marina L.Ivleva, "Ecological Regulation of Economy as a Concept of Social Philosophy", *Voprosy Filosofii*, 2019 #7. P.107-117.
- [10] N.I. Gubanov and N.N. Gubanov, Criminal behavior: biological, social and personal conditionality, *Vestnik slavianskikh kultur – bulletin of slavic cultures-scientific and informational journal*, 2018, vol. 48, no. 2, pp. 53–66.
- [11] M.L. Ivleva, V.A. Inozemtsev, Ekologicheskoye soznaniye i transformatsiya obshchestvennogo soznaniya tekhnogenno obshchestva [Ecological consciousness and transformation of the social consciousness of a technogenic society], Proceedings of the 13th International Scientific Conference "Sakharovskiy chteniye 2013 goda: ekologicheskoye problemy XXI veka" [Sakharov readings 2013: environmental problems of the XXI century], Minsk, International Sakharov Environmental Institute of Belarusian State University, 2013, pp. 13–14.
- [12] V.A. Inozemtsev, Yu.V. Inozemtseva, Ekologicheskoye soznaniye i informatsionnyye resursy [Environmental consciousness and information resources], Theses of the 7th Russian Conference on Environmental Psychology, Moscow, Psychological Institute of Russian Academy of Education, SPb, Nestor-Istoriya, 2015, pp. 208–211.
- [13] V.Yu. Ivlev, V.A. Inozemtsev, Formirovaniye ekologicheskoy paradigmy v obshchestvennom soznanii kak preodoleniye krizisa tekhnogennoy tsivilizatsii [Formation of the ecological paradigm in the public consciousness as overcoming the crisis of technological civilization], Proceedings of the 18th International Scientific Conference "Sakharovskiy chteniye 2018 goda: ekologicheskoye problemy XXI veka" [Sakharov readings 2018: environmental problems of the XXI century], Minsk, Belarusian State University, 2018, pp. 36–37.
- [14] M.L. Ivleva, V.A. Inozemtsev, Kontseptsiya ustoychivogo razvitiya i formirovaniye ekologicheskoy paradigmy v obshchestvennom soznanii [The concept of sustainable development and the formation of the ecological paradigm in the public consciousness], Proceedings of the 18th International Scientific Conference "Sakharovskiy chteniye 2018 goda: ekologicheskoye problemy XXI veka" [Sakharov readings 2018: environmental problems of the XXI century], Minsk, Belarusian State University, 2018, pp. 38–39.
- [15] V.A. Inozemtsev, Yu.V. Inozemtseva, Problema informatsionnykh resursov v usloviyakh formirovaniya noosfernoy ekologicheskoy tsivilizatsii ustoychivogo tipa [The problem of information resources in the conditions of formation of a noospheric ecological civilization of sustainable type], *Izvestiya MGTU MAMI*, 2013, vol. 2, no. 4(18), pp. 57–63.