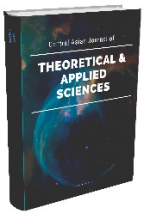

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Problems of Interaction between Man and the Technosphere

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Abstract: *The article deals with the issues of interaction between man and the technosphere in the context of the manifestation of the ecological crisis, which was and is accompanied by numerous disasters for humanity, fraught with global environmental disasters in all regions of the globe. The problems of soil pollution with harmful substances, the problems of fresh water shortage, increased pollution of the ocean, surface and ground waters with harmful substances are also considered.*

Keywords: *Radioactive substances and dioxins, phytoplankton, oxygen deprivation in cities, acid rainfall, Stockholm Conference, Brundtland Report, CO2 emissions, Haber's innovation process.*

INTRODUCTION

With the development of civilization, the deepening of interaction between man and the technosphere began, aimed at creating favorable living conditions for humankind. At the present stage, the issues of interaction between man and the technosphere are of particular importance. This problem is today recognized as one of the important elements of improving the well-being of peoples in all countries of the world.

With the development of civilization, all kinds of threats have repeatedly arisen before humanity, sometimes on a planetary scale. But still, it was a distant prehistory, a kind of incubation period for modern global problems that tend to grow. These dangers fully manifested themselves already in the second half and, in particular, in the last quarter of the 20th century, that is, at the turn of two centuries and even millennia. They were brought to life by a whole complex of reasons that clearly manifested themselves precisely during this period.

The twentieth century was a turning point not only in world social history, but also in the very fate of humankind. The fundamental difference of the past century from all previous centuries is that humanity has lost faith in its immortality. He became aware of the fact that his dominance over nature is not unlimited and is fraught with the death of himself. In fact, never before has humanity itself increased in numbers by 2.5 times during the lifetime of only one generation, thereby increasing the strength of the "population explosion". Never before, has humanity entered a period of scientific and technological revolution has not reached the post-industrial stage of development, has not opened the way to space.

Never before has so much natural resources been required to improve the well-being of mankind, and the amount of waste they return to the environment in the form of waste has also not been so great.

LITERARY RESEARCH

The concept of the technosphere in the sense in which we understand it was put forward by the American geologist and engineer, honorary professor at Duke University (USA) Peter Huff(link is external). Like the Anthropocene, it quickly became popular. For example, this concept formed the basis of the recent major project Haus der Kulturen der Welt (link is external) ("House of the Cultures of the World") – an international center for contemporary art in Berlin, Germany. In addition, just as in the case of the Anthropocene, the notion of the technosphere is controversial, especially given the role – and limitations – it imposes on humans. In particular, it implies that the possibilities of humanity to control the systems of our planet are not at all unlimited, as we might think.

Historical examples of past civilizations testify to the focal nature of human impact on the environment. Now the situation is fundamentally different. The consumption of matter and energy in the past centers of civilization did not have a global and so cosmic scale. The transition to the technosphere led focal civilizations to a kind of unification. An increasing number of countries are involved in the development of the technosphere, in global technogenic processes. The linkage of global processes of an anthropogenic nature and the growing power of their pressure on the planet and geocosmos are the most important characteristics of modern civilization. The emergence of an alternative to this method of interaction between civilization and the environment is hampered precisely by the fact that in the nature of a technogenic civilization there is no other possibility, except for the one that it implements. This model is typically focal in nature, but in terms of its scale, it has grown into a planetary one.

It should be noted that the interaction between man and the technosphere was very strongly reflected in the context of the manifestation of the ecological crisis, which was accompanied and is accompanied by numerous disasters for humanity, fraught with global environmental disasters in all regions of the globe. There is a process of soil contamination with harmful substances, and radioactive substances and dioxins are especially dangerous among them. Soils are degrading – they are losing humus, desertification and salinization are on the rise. In addition, the problem of fresh water shortage began to grow, the pollution of the ocean, surface and ground waters with harmful substances, primarily oil-producing ones, increased. Phytoplankton, the basis of the food chain in the ocean and an important source of oxygen, is dying. Atmospheric pollution continues, temperature inversions are observed. The global climate is changing; the El Niño phenomenon is becoming more and more catastrophic.

For many centuries, the human habitat has slowly changed its appearance and, as a result, the types and levels of negative impacts have changed little. This continued until the middle of the 19th century – the beginning of an active growth of human impact on the environment. In the XX century as a result of large-scale anthropogenic activity in many regions of the world, global pollution of the environment and vital sources with substances hazardous and harmful to human health has occurred. Zones of increased pollution of the biosphere emerged on Earth, which led to its partial, and in some cases to complete regional degradation. These changes were largely driven by:

- high rates of population growth on Earth (population explosion) and its urbanization;
- growth in consumption and concentration of energy resources;
- intensive development of industrial and agricultural production;
- mass use of means of transport and a number of other processes.

Referring to the data of the source [1], we can state that it is far from the first generation in a row that humanity lives with a constant and obsessive fear of environmental disasters. Deforestation, ocean pollution, ozone depletion – we have heard these phrases in our lives hundreds, if not thousands of times. Man has interacted with and influenced his environment since the very beginning of his species. However, this influence reached a truly tangible scale only in the eighteenth century, with the beginning of the industrial revolution. At that moment, man left the natural circulation of wildlife and began to dictate his own rules to the planet. The planet began to change, but we noticed it far from immediately – our civilization was busy with other things: the extraction of fuel (coal, gas, shale, oil), metal and other minerals. All these substances, bred in the natural way of nature and seized by man, returned to nature, but in a different form. It turned into a global pollution of soil, water and air and became the cause of the ecological crisis. And the intensity of this process continues to grow at a catastrophic pace, and the serious consequences of the ecological crisis will have to be eliminated by mankind in the near future.

According to the authors of [2], new negative factors are being formed in the modern technosphere: working conditions and human life significantly exceed the adaptive, physiological and psychological capabilities of the body. As the pace of technological progress accelerates, the impact of human economic activity on nature becomes more and more destructive. Therefore, the problem of ensuring the safety of human activities is becoming increasingly relevant. The time has come to think about ways and possibilities to maintain the quality of the environment at the level necessary to maintain human health and the sustainable existence of all terrestrial living populations. Otherwise, humanity will be at a level before the fact of the emergence in nature of irreversible processes of a global scale, leading to the death of all living things.

According to the authors of [3], at the present stage of human development, perhaps, the hottest problem – is how to preserve nature and civilization, since no one knows when and in what this form or that catastrophe can occur. For thousands of years, man lived, worked, developed, but he did not even suspect that the day might come when it would become difficult, or maybe impossible, to breathe clean air, drink clean water, grow anything on earth, since the air is polluted, the water is poisoned, the soil is contaminated with radiation or other chemicals. All this is a real threat to the entire civilization. In addition, what can be the conclusion? Another Chernobyl or Fukushima, or maybe even worse. So maybe we should think about it? Each person must be aware that the whole civilization is on the verge of death, and whether we survive or not is the merit of each of us. There is no doubt that the inventive human mind will eventually find a replacement for them.

The authors of [4] give an example of an ecological catastrophe caused by a military conflict that occurred in Kuwait and nearby areas of the Persian Gulf after Operation Desert Storm in early 1991. Retreating from Kuwait, the Iraqi invaders blew up over 500 oil wells with explosives. A significant part of them flared up and burned for six months, poisoning a large area with harmful gases and soot. From wells that were not inflamed, oil gushed out, forming large lakes and flowing into the Persian Gulf. A large amount of oil spilled here from the blown up terminals and tankers. As a result, close to 1554 km^2 of the sea surface, 450 km of the coastline were covered with oil, where most of the birds, sea turtles, dugongs and other animals died. Flames burned 7.3 million liters of oil every day, which is equal to the amount of oil that the United States imports daily. Clouds of soot from fires rose to a height of up to 3 km and were carried by winds far beyond the borders of Kuwait - black rain fell in Saudi Arabia and Iran, black snow - in Kashmir (2,000 km from Kuwait). Air polluted with oil soot had a harmful effect on people's health, since the back contains many carcinogens.

The site [5] indicates that in the seventies of the last century, the world realized the need to urgently solve the problems of ecological balance on the planet. For the first time at a high political level, this topic was raised in 1972 in Stockholm, at the UN Conference on the Human Environment. It was recognized that

environmental problems have taken on an alarming scale, and in order to solve them, it is necessary to unite the efforts of the entire world community. The Stockholm Conference has significantly intensified environmental action at all levels. However, it soon became clear that the degradation of the global biosphere is proceeding at a faster pace than the efforts being made. To analyze the reasons for this situation, in 1987 the World Commission on Environment and Development prepared the Our Common Future Report, also known as the Brundtland Report, in which the term "sustainable development" appeared for the first time – that is, such development that preserves resources for future generations while meeting the needs of current generations. The Report identified overconsumption in developed countries and poverty in developing countries as one of the key causes of environmental degradation and showed the need for the world community to join forces and help the developing world to save our planet.

The uncontrolled and reckless use of scientific achievements, the spread of large industrial enterprises, in addition to benefits, caused a lot of harm to the environment – widespread pollution of water, air and soil. Under the influence of negative human impact on nature, the structure of the natural landscape is distorted, the natural resources of the planet Earth are depleted.

METHODOLOGY

For many millennia, people almost did not feel the restrictions from the environment. In addition, if they saw that in the nearest district the amount of game exterminated by them decreased, the cultivated soils or meadows for grazing livestock were depleted, and then they migrated to a new place. This process has been repeated for centuries. The natural resources of the Earth seemed inexhaustible. Only sometimes such a purely consumer approach to the environment ended in failure. More than nine thousand years ago, the Sumerians, in order to feed the growing population of Mesopotamia, began to develop irrigated agriculture. However, the irrigation systems they created eventually led to waterlogging and salinization of the soil, which was the main reason for the death of the Sumerian civilization. The Maya civilization, which flourished in what is now Guatemala, Honduras, and southeastern Mexico, collapsed about 900 years ago, mainly due to soil erosion and silting of rivers. The same causes caused the fall of the ancient agricultural civilizations of Mesopotamia in South America. The cases cited are only exceptions to the rule that said: draw from the bottomless well of nature as much as you can. In addition, people scooped from it, not looking back at the state of the ecosystem.

As you know, due to the increase in the rate of anthropogenic pressure on nature, it led to a violation of the ecological balance and caused degradation not only of the environment, but also of people's health. The biosphere gradually lost its dominant importance and in the populated regions began to turn into the technosphere.

The technosphere, which is part of the biosphere, is also a complex system with special development dynamics. The factors behind its emergence include the human ability to create complex social structures, as well as to make and use tools. However, Peter Huff notes that people are not so much the creators and managers of the technosphere as one of its components, and therefore they should do everything possible to ensure its continued existence. It is worth doing this, if only because most of the human communities need the technosphere for food, shelter and other resources. Thanks to its development, humanity has stepped far ahead and increased its population from several tens of millions to 8 billion people who inhabit the planet today. Only one artificial fertilizer technology, based on the innovative Haber process (link is external), can feed about half of the world's population.

Like the biosphere, the technosphere is not only a collection of machines, but also people, as well as all the social and professional systems we have created, through which we interact with technology: factories, schools, universities, trade unions, banks, political parties, the Internet. Part of it is domestic animals and livestock, which we massively breed for our livelihood, plants that serve as food for our

animals, agricultural lands that we have adapted to our needs, significantly changing their original appearance and ourselves.

The technosphere differs from the biosphere by one important point: the biosphere perfectly "knows how" to process the waste products of its constituent organisms. This feature of her has allowed her to exist for billions of years. The technosphere, on the other hand, does not have this ability, as eloquently evidenced by the mountains of plastic garbage in the oceans and on the beaches of the whole world. Some of the waste is not visible to the eye, such as carbon dioxide produced by the combustion of fossil fuels. In addition, although it has neither color nor smell, its mass is more than tangible for our planet: CO_2 emissions into the atmosphere because of human industrial activity have reached a whopping figure of about 1,000 billion tons, which is equal to about 150,000 Egyptian pyramids in weight. If we do not solve the problem of the rapidly growing amount of waste, it may threaten the future of the technosphere – and therefore all of humanity.

The technosphere can be considered a kind of parasite that has settled in the biosphere and radically changes the conditions of life on Earth. The obvious consequences of this include a significant acceleration in the rate of extinction of plant and animal species, as well as changes in the climate and chemical composition of the oceans, which have a detrimental effect on existing biological communities. These changes can cause damage to the entire biosphere and humanity in particular. Ideally, people should make every effort to ensure that the further development of the technosphere becomes more sustainable from an environmental point of view. However, humanity has no other choice but to keep the technosphere in a “working” state, since it has become vital for us.

According to experts, in 30 - 50 years an irreversible process will begin, which at the turn of the 21st - 22nd centuries will lead to a global environmental catastrophe. A particularly alarming situation has developed on the European continent. Western Europe has basically exhausted its ecological resources and, accordingly, uses others. There are almost no intact biosystems left in European countries. The exception is the territory of Norway, Finland, to some extent Sweden and, of course, the Eurasian part of Russia.

During its existence, and especially in the 20th century, humanity has managed to destroy about 70 percent of all natural ecological (biological) systems on the planet that are capable of processing human waste, and continues their "successful" destruction. The amount of permissible impact on the biosphere as a whole has now been exceeded by several times. Moreover, a person releases into the environment thousands of tons of substances that have never been contained in it and which are often not amenable or poorly recyclable. All this leads to the fact that biological microorganisms that act as a regulator of the environment are no longer able to perform this function.

It should be noted that with the development of the tenosphere, clean air around settlements almost completely disappears, rivers turn into sewers, piles of garbage, landfills, crippled nature are everywhere - such is the striking picture of the insane industrialization of the modern world. Atmospheric air pollution is the most serious environmental problem of modern cities; they cause significant damage to the health of citizens and green spaces. Over large cities, the atmosphere contains 10 times more aerosols and 25 times more gases. At the same time, 60 - 70% of gas pollution comes from road transport. In general, vehicle emissions are significantly more toxic than emissions from stationary sources. Along with carbon monoxide, nitrogen oxides and soot (for diesel vehicles), a running car releases into the environment more than 200 substances and compounds that have a toxic effect. Among them, heavy metal compounds and some hydrocarbons, especially benzapyrene, which has a pronounced carcinogenic effect, should be distinguished.

CONCLUUSIONS

In connection with the development of the technosphere, we are faced with a number of difficult tasks, one of which is to calculate the possibilities available to us for effective socio-economic and political measures, taking into account given conditions. First of all, we must try to understand as well as possible the principles of the functioning of this new and unprecedented stage in the development of our planet, and for this we still have a lot to do.

From all of the above, it follows that the time has come to sound the alarm publicly in order to warn the peoples of all countries about the impending danger threatening humanity and civilization. Humanity today has no more serious concern than to find the strength, find the means, find the mind to get along with nature and resolve the issues of interaction between man and the technosphere. Otherwise, we will have to return to some semblance of the Stone Age, a dark era of violence and cultural degradation.

As a conclusion, we would like to quote the statements of academician N. Moiseev: “The original meaning of any knowledge, any scientific discipline is to comprehend the laws of your own home, that is, that world, that environment on which our common destiny depends. From this point of view, the entire set of sciences born of the human mind is an integral part of a certain general science about how a person should live on Earth, how he should be guided in his behavior in order not only to preserve himself, but also to ensure the future of his children, grandchildren, their people and humanity as a whole.

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