Socio-Technogenic Transformation of the Biotic Cycle of Substances on Earth

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Abstract. In the article, the authors analyze how, under the influence of the social and technological development of the world, one of the fundamentals of the biosphere is transformed, which includes biogeo-exchange phenomena and processes, alone with the soil cover, living substances of the planet and the living environment formed by it. The active and growing technogenic influence of the society on the biospheric nature begins with the formation of a productive economy, massively building the inanimate artificial world which is called the technosphere. The statistical material analyzes the negative impact of a technogenic society on the constituent parts of the natural nutrient cycle and the losses in soil metabolic processes with destructing the planet soil covers, vast spaces of biospheric forests and injuries. It results in socializing the most important parts of natural gyros replacing it with anthropo-technogenic cycle. This is accompanied by transforming people and domesticated living organisms into the technospheric conditions of urban life in which pathological, genetic and other diseases of the human body, as well as socialized animals, develop. The authors conclude: as a result of the technocratic development of the Earth’s land surface, the anthropo-technogenic cycle of substances is becoming an important part of changing the life evolution – from biosphere-biological to sociotechnological, or post-biospheric. Consequently, for preserving biospheric life, it is necessary to reasonably restore many of its fundamentals, including the biotic circulation, the unification of the peoples of the world under the auspices of the UN to jointly solve this global problem.

1. Introduction

As you know, there are two large cycles of substances on the Earth – geological and biotic (biospheric, biological). They are provided by the energy of the Sun. The geological turnover consumes half of the incoming energy, historically reconstructing the geological layers of the planet surface. All chemical elements are involved in it. The biotic turnover consumes only 1% of energy, due to which all living biospheric organisms exist and develop, as biogenic elements participate in it. It is a cycle of substances between soil, plants, animals and microorganisms. This cycle is an indispensable condition for the existence of the biosphere, and serious violations of the natural cycles of substances and energy can lead to the death of biosphere life. The small circulation occurs at the ecosystem level, as a result of which nutrients, water and carbon accumulate in the plant matter, and then are spent on building the body of the plants themselves and the animals eating them.

The decomposition products of organic matter under the influence of destructors and microorganisms (bacteria, fungi, worms) are again decomposed into mineral components and are involved in the meta-
bolic fluxes of living matter. In fact, this natural circulation is now disrupted by humanity, representing a danger to life on the Earth for almost 4 billion years.

It is the stated questions that are raised by the authors in order to analyze and uncover the dangers that have arisen in maintaining biosphere life on the Earth due to serious violations in the biotic cycle of substances. Some of the violations are on the surface, but scientists and specialists do not attach much importance to them, other violations are still hidden because of underestimating the role of the biotic circulation itself by biologists, ecologists, soil scientists, and specialists in other sciences of biosphere life. It is spoken first and foremost about the UN and its subordinate organizations. Discovering serious miscalculations will give us all the materials for additional in-depth studies by many sciences, developing proposals and making sound decisions for determining the safe social and economic development of both Russia and the earthly world [7].

2. Methods
Philosophy and science began to use new methodological approaches to studying various natural phenomena that are organically linked with technogenic social development. The technogenic society is not limited to cumulative interactions of constituent parts and processes, but its anthropogenic impact extends to the biospheric nature. The latter, negatively transforming, makes significant changes in man. That is why we attach particular importance to the systemic socio-natural approach. Its ideas go back to the works of the patriarchs of the noosphere, and above all to V.I. Vernadsky [17] and P. Teilhard de Chardin [14]. They speak about forming humane relations of humanity and the biosphere, leading to a new earthly world. Society and biospheric nature should develop more and more as interacting and integrating systems that change all the old parameters in their historical interaction.

Humanity was generated by the biosphere, formed in it into social systems, developed and strengthened through science and new productive forces, becoming its overactive subsystem. Now humanity itself is transforming the biosphere. People act basing on ill-considered, irrational needs and bringing into the world not only new cultivated organisms, but also synthesized chemical elements. Consequently, studying the impact of humanity on the biospheric nature and critically evaluating it, we can draw certain conclusions about the future of living nature. Unfortunately, neither biologists and ecologists, nor sociologists and others investigate thoroughly the essence of forming a new, inherently integrated world – sociotechno-natural world [5]. They don’t notice how technogenic community barbarously destroys biosphere life, creating an anthropogenic man-made circulation instead of a century-old natural biotic cycle of substances [2; 15].

3. Results & discussion
Biologists and environmentalists still present in textbooks and lectures the biotic cycle of substances as it was thousands of years ago, long before the advent of agriculture as the first stage of a producing economy on the Earth, that is 10-12 thousand years ago. It was with the transition to agriculture that humanity ended its collective way of life, in which, like all animals, people ate the products of the biosphere. Since the base of nutrition was significantly reduced due to destroying large animals by people, the humanity was forced to look for a new niche of life. As a result it passed to settled life, the cultivation of soil, plants and animals. Developing handicraft in agriculture gradually led to forming industrial growth, its separation from the village.

Mankind entered the period of the industrial revolution in the West more than two centuries ago, creating a new, post-agricultural stage in developing socio-biosphere life that is an organically interconnected social-technogenic and biosphere-technogenic life. In 1993 at the 19th World Philosophical Congress one of the authors (E. Demidenko) called in the report to direct people's energy to the preservation of biosphere life and biospheric man in connection with the beginning of serious technological changes in the society, the biosphere and man [3].

The first global process of reclaiming, or socializing the natural circulation began to actively develop with the transition of humanity to a productive economy. Humanity began and continues to cultivate biospheric plants mainly as annuals for expanding food, not noticing the destructiveness of forming such
technologies. This happens due to the ignorance of the essence of both biospheric life in general and soil in particular. With repeated annual soil treatment, turf, developing over the centuries, destroys, and open soil erodes [18]. As a result, the nutrient (humus), which accumulated for hundreds of millions of years, is removed from the soil and carried to rivers, seas and oceans.

With the mankind’s transition to agriculture, the developing population of the planet had consumed by the end of the twentieth century (over 10 thousand years) 2 billion hectares of fertile land, with 0.7 billion hectares of them over the past three centuries of industrial development. The planet operates in agriculture 1.5 billion hectares of dilapidated soils [13, p. 339], which is sufficient for traditional agriculture for 1.5-2.0 centuries if you carefully preserve the soils. On the Earth, there are about one billion undeveloped soils in reserve, however, according to Professor of Moscow State University A.S. Yakovlev, they will be enough only for 30-40 years [20].

The second global process of the cycle socialization is generated by the traditional annual overturning of soil by plows, which not only leads to increased soil erosion, but also to deterioration in their quality. It is associated with harming microorganisms – aerobic and anaerobic, as well as a 2-week delay in obtaining crop and other disadvantages.

The third global process of the cycle socialization is associated with rapid urbanization, in fact, with the revolution in the sphere of the planet technospherization, which began during the industrial revolution in Western Europe. The idea is that the industrial-technogenic society forms industrial cities and industrial-urban lifestyles of the population and after this radically changes the biotic circulation of vital substances in the urban environment. As our calculations show, for two centuries (since 1800) the population of the planet has increased 8 times, the city population has increased 84 times.

Let us turn to the facts. In the era of technogenic development now being organized by mankind, the spaces of the lithospheric part of the biosphere are populated not only by cities, but also by man-made lifeless soils. Together, they cover 55% of the land [10, p. 43-44], reducing the biosphere and destroying its life-creating functions. During this period, the third deadly form of the global biotic cycle of substances on the planet was formed. Since there are a little more than 50% of urban citizens in the world, half of the nutrients that we take from the soil is sent by transport to the cities in the form of food and light industry goods. There biological wastes from production and households are sent in two directions and they are mixed up with synthesized chemicals: 1) solid wastes are sent into dumps for temporary storage and subsequent burning and 2) liquid wastes are sent into the toilet system, going to the seas and oceans, and not to the soil.

The fourth global process of the cycle socialization and destruction of biospheric biological substance is associated with excavating oceanic and marine biological resources. By their usefulness they occupy a fairly high place among biological substances, being highly environmentally friendly and beneficial to health and being the prevention of so many human diseases. Getting into the countryside, they are partially sent to fields in the form of wastes. They are used there to get crops in homestead plots, but in cities the marine biological substance has the same fate of their losses, which was mentioned above.

The fifth global process of altered and disastrous cycle of substances relates to a living biospheric matter, which is mainly concentrated in forests and which is destroyed. The bulk of the forest has been damaged in the last two centuries and the mass of bio-substance is estimated to be reduced by half during this period. This vital substance for reproducing life is losing now almost completely, is not returning to the soil. It is used for industrial purposes, and then is burnt in the form of solid wastes [16].

And finally, the sixth global process of the destructive biospheric cycle of substances concerns the transition of people and cultivated animals to the urban technosphere, in which post-biosphere life is concentrated. Moreover, the transition to it is very fast. If in 1860 about 5% of the animals of the planet, including humans, were in the technospheric conditions, by weight, in 1940 10% were in the technospheric conditions, in 1980 20% were in the technospheric conditions, now 40% are in the technospheric conditions [12], by the end of the century it is expected to be over 80%. These animals are switching over to biotechnological support and this means almost complete isolation of these animals from the biosphere space that is living out the last days. A vivid example of life in the technosphere
are concrete livestock farms, in which a cow, according to a number of specialists, lived one-third less than its life expectancy and yielded one-third less milk than cows living in peasants’ earthen barns. The dangers of life in the urban technosphere speak of the advent of a deadly crisis this century, which medicine cannot cope with, as the exchange biospheric processes are reduced to a minimum, and man-made dominates [4; 6].

According to expert estimates, 150 thousand anthropogenic substances, including 2-3 thousand new ones, get into the biosphere annually. Most of them are not analyzed for toxicity, mutagenicity, carcinogenicity and teratogenicity [11; 19]. All this could not but affect a person: in the analysis of 10 newborns’ umbilical blood for having 471 industrial contaminants 287 foreign chemical substances were detected in it at perceptible concentrations [1; 8; 9]. These and other facts speak for the fact that we are already dealing not so much with the biospheric cycle of substances as with anthropotechnogenic cycle [2].

4. Conclusion
In conclusion, the authors propose a reconstruction of the biotic cycle of substances, already transformed by a technogenic society, disturbed in the XIX\textsuperscript{th}-XXI\textsuperscript{th} centuries by industrialization, urbanization and technospherisation. The essence of the proposals is in a rational change of the anthropotechnogenic biotic cycle of substances created by people alongside with preserving the biosphere-biological substance, which may disappear in the next century, and with it the biosphere life may disappear too, going into the urban technosphere.

The authors propose a safe and promising scenario of stabilizing and strengthening the natural biotic circulation: 1) preserving the areas of soil cover even with a small humus saturation, followed by agro-measures on organic saturation; 2) maximum preserving forest areas with the resolution of selective felling of trees, which will allow conserving the variety of created life; 3) a significant increase in the yield of annual crops, so that the released area could be transferred to the sowing of perennial grasses restoring the diversity of life; 4) the maximum preservation of the remaining biosphere-biological substance on the planet, created by self-development on land for about 400 million years; 5) partial restoration of biospheric spaces, especially in the regions with favorable climatic conditions and active self-development processes, through the use of perennial grasses and vermitecnologies; 6) ceasing the production of hazardous and low-quality technospheric objects and rejecting any dangerous synthesized chemicals that destroy biospheric organisms; 7) an appropriate rationalization of the political system and the organization of such vital activities of the peoples, which defend the harmony of production with a living organism. A new understanding of preserving the biotic cycle of substances does not mean a complete return to the former biosphere, the former cycle, but creating conditions for the continuation of the biosphere self-development with the combination of technospheric structures that do not harm biological creatures.

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