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ECOLOGY, INSTABILITY, INNOVATION

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ABSTRACT

Methodological issues of development of modern architecture in aspect of world ecological crisis are considered. Author has analyzed the history of ancient civilizations, their dependence and a tranformation in a consequence of natural factors change. The necessity of forming of the new scenario of interaction of people and the nature has been revealed and proved. On the basis of conducted research author suggests to reveal some factors influenced on eco-friendly architecture creation, as well as presents some existing modern examples, able to solve the discussed issue.

KEYWORDS: Architecture, Ecology, Innovation, Evolution. Environment, Nature, Technology

PROBLEM DESCRIPTION

Today's society is entering a new stage of its development. Naturalists have realized this fact first. Let us recollect the beginning of the 20th century, when V. I. Vernadskiy first mentioned that "humanity is transformed into the main geological forming force of the planet" Twenty years later, LeRoy and Teilhard de Chardin have invented the term "noosphere". [7] And on the edge of 60ies, V.A. Kovda has showed that humanity is the main waists producer: it produces two thousand times more garbage of organic origin, i.e. material which is excluded from the natural circulation of substances, than the rest of the biosphere. Gradually, it became clear that the pressure made by human activities on the environment, is not just becoming a factor that determines its evolution, but also is growing so fast that it is not possible anymore to imagine the equilibrium of the biosphere and simultaneously maintenance of homeostasis of Homo sapiens species at the same time. [8]

One more statement must be added to these considerations, a very trivial one if to consider in terms of population dynamics: no other species alive, becoming a monopolist in its ecological niche, is not able to avoid the environmental crisis. And it can have only two possible outcomes: either the species starts to retrograde, or it modifies itself appropriately (changing standards of its behavior and relationships with nature), and forms a new ecological niche. And the mankind has been doomed to monopoly a long time ago.

From all the said above it follows that humanity will inevitably be drawn to the environmental crisis of the global scale, as the entire planet has already been captured by humanity in the XXth century, and since then it has been cooperating with nature as a united species. In order to prevent its degradation, humanity is doomed to make an agonizing search for a new ecological niche. Our modern views on global features of the evolutionary process can be expressed as the co-evolution of the biosphere and society, i.e. their joint development as an absolute condition of survival of the human species in the planet. Stage of human history, when a needed quasi-equilibrium of society and nature will be reached, has been called the era of the noosphere.

The question of the feasibility of such a relation between nature and society, i.e. the question of preventing degradation of humanity as part of the biosphere, is reduced substantially to the formation of a new civilization. And this question still remains open. But one thing is absolutely clear: the progressive disequilibrium between society and the rest of the biosphere, destruction of natural biosphere cycles leads to deep civilizational confrontations.

Criteria for reintegration of humanity into the nature will inevitably occur in artificially organized environment as a buffer between humans and the natural environment. Architecture is responsible for optimization of such an environment.

Objective: to identify the main trends in the development of modern architecture in terms of the global ecological crisis.

Keywords: architecture, ecology, innovation.

The level of the topic scientific development.

Works of F. Girenok [2], O. Spengler [3] A. Nazarchuk

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[4] B. Trukhachev [5] D. Lyuri [6] N. Rodzevich [7], D. Samin [8], N. Moiseev [9] and some others have been analyzed to complete the research of the problem stated in the present article.

The analysis of main trends of modern architecture development in terms of the global ecological crisis that had been presented in the present article, inevitably overlaps with the above developments.

RESEARCH RESULTS

Human being is a part of the biosphere. He has appeared in result of its evolution. That is why studying of human being's development process in the context of world evolution process gives rather useful angle for review of events in social sphere and particular assessment of what is happening in the public sphere and definite ideas about possible developments.

Development of any living species, any population can occur only in a rough limited range of environment characteristic changes. Similar statement can be applied to the human being as well. Moiseev introduced the concept of "ecological imperative" as a set of properties of the environment which are not to be changed by human activity under any circumstances. In other words - some human activities, especially the level of effects of humans on the environment should be strictly limited and controlled. The category of "environmental imperative" is objective, it does not depend on the will of the individual, but is defined by the correlation of the natural environment properties and social and physiological features of the species. [9]

Analysis of the Sumer, Ancient Egypt and China history together with numerous research in this area demonstrate a direct relationship of civilizational structures and their evolution to changes in natural factors. The reasons for these changes could be different. Many of them were related to climate variations, as in Egypt. Others were caused by increasing of human pressure on the environment, as in Sumer or China. In some cases, civilizations were not able to adapt to them and vanished in history, leaving only vague memories, as it was with ancient Sumerian civilization. In others, these difficulties were the source of new takeoff, when civilization was able to expand its ecological niche.

Such a dependence can be clearly seen in the Middle Ages, for example, in the history of the Scandinavian countries and particularly in Iceland. Oncoming of the "Little Ice Age", which complicated the ice conditions in the North Atlantic, overshadowed the settling of America from the 12th to 15th century. Who knows how would history of mankind be developed, if the deterioration of the ice conditions would not disrupt connections with the Wineland, the successful development of which was started by Erik the Red. In modern conditions human's dependence on natural factors has increased manifold, for exponentially growing influence on the nature changes (also exponentially) the nature itself, and hence the people's living conditions.

As for the present time, the relationships of society with the environment will play the decisive importance in the history. They will initiate civilizational conflicts, as mankind has come to the threshold of the permissible, and different civilizations will perceive natural limitations and seek their ways of further development in different ways.

Dependence of human destinies on natural factors throughout history was perceived by them as a manifestation of some higher power. Its reactions to the changes in the characteristics of the environment were of a spontaneous character. For example, strengthening monsoon rainfall in Abyssinia increased flooding of the Nile, as the result the people went to the South and Lower Egypt has been impoverishing and losing its importance. When the climate was becoming drier, flooding of the Nile were reduced and the center of the country again moved in a more fertile Lower Egypt. This has also happened when the natural environment was changed due to the fault of the humans - the fact which they certainly did not realize by themselves. For instance, soil salinity occurred in the lower reaches of the Tigris and Euphrates has been occurred because over watering soils. People gave up their land that time and went away from their homes. Sumerian culture had collapsed, had been forgotten, and archaeologists have established the existence of one of the oldest agricultural civilizations of the ancient world only in early 20^{th} century. The Chinese were smarter than Sumerians: when the population increased and there was a lack of food, they have learned to grow rice in checks, filled with water, and learned to plant fish there. Land productivity has increased many times. Country has emerged the ecological crisis, and, moreover, grew rich, and then ancient Chinese civilization had flared.

Nomadic way of life is also kind of reaction of

populations to anthropogenic environmental changes. In other words, society had always somehow reacted to changes in the environment: not only by changing the location, but also generating new form of government and powers, inventing new technologies, etc. And, what is most important, people had developed new forms of relationships with nature and between each other. There was a very complicated process of self-organization, which sometimes led to failure into a tailspin when dramatic changes had been occurring in relatively short period of time. Great migrations of the peoples are good examples of it.

If we exclude reconstructions of bifurcational character, we will see that similar processes of mutual adaptation of nature and society were going on for centuries, sometimes it took whole epochs. Society not only adapts itself to the surrounding nature, but always somehow adjusts the nature to its needs but it is always important to what extend it was made. "Natural" change of natural characteristics usually happens slowly enough according to the human scale, and even more so under the influence of human activity: in the old days it might become visible only in the interval of life for many generations. That's why humanity throughout its history until modern period lived in the conditions similar to those which we define as “homeostasis."

And in this sense the behavior of Homo sapiens is not much different from that of other species, which are also adapted to changing environmental conditions and adapted nature to their needs. For example beavers that build dams and swamp some areas, changing not only the conditions of life, but also character of landscapes. For the same reasons, scientists were not very interested in peculiarities of human being as a natural part of the biosphere. And a whole layer of problems dropped out of sight of the science. That is why, the social sciences were not ready to accept modern environmental challenge.

This is necessary because the current situation has qualitatively changed: anthropogenic environmental change may already significantly alter the human condition in the lifetime of just one generation, and hope for a "natural”, i.e., spontaneous adaptation of civilized humanity to such changes is not only illusory, but extremely dangerous. New types of conflicts appear, and attempts to solve it with the help of old methods can lead to disaster. Together with that ecological imperative method cannot be provided within the framework of the traditional scheme adaptation of society to changing conditions that occur due to life of the society itself. Actually, it requires the creation of new type of the relationship between nature and people in a relatively short time.

All this reveals completely new challenges and problems in front of the science and architecture.

Techno culture

With the emergence of the industrial revolution and industrialism the corresponding set of ideas about the place and role of man in nature and society has been evolved. Gradually, the most advanced scientific understandings of physical sciences, especially mechanics, formed the basis not only of the physical picture of the world, but also became the core of ideology. This mechanistic worldview was primarily anthropocentric. It has actually admitted permissiveness of human activity in nature. At the same time, being a purely mechanistic, it virtually ignored the “environmental" aspect in the existence of mankind. The man who has mastered the ideological representation of the industrial epoch, mechanistically imagined socio natural process development, he evaluated its evolution in terms of quantitative transformations, forgetting about the possibility of qualitative changes. [1]

Philosophical ground of the existing system (in simplified form) is as follows: A person is considered as an extra natural object, the Nature - as inanimate storage of goods and resources that can and should be used in accordance with the will and desire of Human Being. In other words, in parallel to the increasing pressure on the environment, there was a formation of the corresponding philosophy of conquering nature. Image of human being as a “king of nature ", and his right to change the environment in correspondence to his own desires, became considered as granted. Such an "aggressive consuming anthropocentrism” has become an ideological framework of the ecological crisis. [2]

Triumphal procession of rationalistic attitude to the nature, yet so noticeable recently in modern science and technology, can turn an unprecedented human enslavement. Dialectics of the technology is as follows: on the one hand, it proves the superiority of a man over the nature, it is based on a human being's ability to see things different from what they are in their natural context, and thus make them suitable for their purposes.

But on the other hand it is quite clear that technology helps to satisfy both extensive and intensive needs, especially instincts, as fast as possible. Technocratic civilization, freeing man from the power of nature, rebinds him to it again, because technology creates new needs, meta needs, as we call it[2] , i.e. needs that are satisfied indirectly, in a specific technical way.

Ultimately, the following has happened: striving to achieve the immediate objectives, mankind has eventually got results that were not desirable and sometimes even diametrically opposed to the expected ones, and were able to undo all the positive results. An urgent need to provide a healthy living environment for present and future generations by the man himself has been emerged recently.

In the 20th century, the machine, as a microcosm, is rebelling against human as man could rebel against the God earlier. The lord of the world now has become a slave of machine. “The tragedy of our time is that the human mind devoid of ties is no longer able to catch their own consequences .... the civilization itself has become a machine that does everything in the image of the machine" . [3] Civilization that born on the basis of technology is a predator, that is even scarier than a man, as it puts at threat all the organic life, leaving no place in it for man -- a creator of culture. " Riled harness implies overthrown winner to death " [3].

Hence -- the greatly increased longing for the past, runaway to the Middle Ages, the pessimism and occultism prevailing in the outlook of the epoch, making, according to Spengler, "Faustian culture", similar to the Roman culture in time of Augustus.

Therefore, the most acceptable way out of the ecological crisis, if such a solution can be found at all, is seen in the form of a long-term transitional program of environmental change, which should be based on the program of technical rearmament of society (future development of technology might be a biotechnological one) as well as on lots of social programs – programs of society education and transformation, change of needs, mentality and so on.

Therefore, a new meaning, different from what is offered by politicians and economists, should be invested in the concept of "sustainable development". In fact, we should talk not only about sustainable development, but also about some set of actions that could provide the co-evolution of man and the environment. Its development is a fundamental problem of modern architectural science. Maybe the whole history of human knowledge, our common culture is only a preparatory stage to solve this problem. Maybe the fact of survival of our species depends on it too.

In aviation, there is term, “point of no return” - the point where it is still possible to return the plane back. To pass the point of no return - means to lose the opportunity to get back to the start of the flight, because of fuel consumption, and taking into account the effects of wind, the plane cannot either return to the aerodrome of departure or at the alternate aerodrome anymore. For our civilization "the point of no return” -- is the limit beyond which it is impossible to restore the natural environment. But the turning point when the catastrophic environmental changes will make the existence of populations impossible is rather close.

Architecture and ecology

As we can see, human economic activity has become a factor that caused another crisis of nature. In the worst scenario, ecosystem will recover after a very long period, though in a new shape, loosing most of its species. Other scenarios are entirely dependent on the humanity’s will and knowledge. A huge role is given to architecture in this process. Humanity should be localized and separated from the nature on a rather long period. And only artificial environment, such as city, can become a place of humanity localization. I we will provide for ourselves maximum energy, raw materials, food and water, we will be able to become self-sufficient, and hence complete the transition from parasitic way of life to cooperative one - consumption without destruction. Later, as the accumulation of knowledge and technology will be multiplied, and, what is more important, when the ideology of consumption will be changed, humanity can pass to a fundamentally different kind of parasitism - mutualism. The idea of mutualism is not new for humanity - " We cannot wait for favors from nature , take them from it - that is our goal", or, paraphrasing Kennedy- "Do not ask, what nature has done for you, ask what you can do for nature”.

All these basic criteria for reintegration of humanity into the nature will inevitably occur in artificially organized environment as a buffer zone between humans and the natural environment.

Architecture is responsible for optimization of such an environment. Consequently, the demands from the architecture will be radically different from the old experience gained by masters of the past. nowadays the development of architectural and construction industries of leading countries have been already provided a strong variability of architectural objects. As a result, there is an impression that Vitruvius and F.L. Wright are closer to each other than F.L. Wright and Zaha Hadid. We can only guess how many mutations will happen with architecture while going towards requirements of nature integration. Either already created projects of ecofriendly constructions, or so called "paper" architecture can become the basis for such forecasts. A wide range of formal innovations interpretation brought to the architectural-constructional branch nowadays can also be a basis for future forecasts.

At the moment, there are several major factors that are drastically affecting the establishment of ecological architecture:

1. Alternative energy. Most scientists agree that if humanity decides the problem of pure energy from renewable sources and receives it in quantity, sufficient for its needs, all other problems can be solved. Cheap energy has become the basis of modern civilization development, environmental energy is the only real alternative to fossil energy sources.
2. Decision of the agrarian question. Agriculture is making the greatest influence on the environment. Such a strong impact is based upon several factors:

• Plowing and removal of natural vegetation zones;

• loosening of the soil, especially with respect to the use of certain devices such as depleted plow;

• The use of pesticides and fertilizers in the agriculture;

• land reclamation.

Due to the impact of negative factors, the soil loses its qualitative characteristics. Soil ecosystems are destroyed, the humus layer disappears or becomes relatively paltry and is not able to provide the entire amount of needs. It should be noted that the soil is becoming more compacted and its structure is gradually losing its former order. Soil erosion is one of the main negative effects of it. [4].

A number of modern technologies allows to minimize or even eliminate the negative effect of the implementation of agricultural activities. The concept of urban agricultural farms can be a good example of it. Nowadays it is actively developed by scientists and architects around the world. Dixon Depome is the author of the concept had made a calculations conclusively proving the necessity of reforestation of the planet. The only available means he believes it is the urban agricultural enterprise, namely vertical farms. [56].

3. Transport issues. There are several major factors of negative impact of transport on nature:

• Disasters and illegal discharge of oil and waste at sea;

• The burning of fossil fuels in engines and thereby reducing its holdings;

• Air pollution during fossil fuel burning and evaporation;

• Separation with the barriers of land and forests, that crushes geobiocoenosis into small pieces, making it not able to self-sustain;

• Taking of land and water for transport infrastructure;

• Creating dumps of write-off transport and spare details;

The main directions of greening the transport sector are the following:

• Development of urban public transport infrastructure.

• Creating a communication structure for cycling.

• Creation of urban areas with limited access of private vehicles not conforming to high standards of environmental safety.

4. Industry. The main problem of industrial production today can be considered as increasing of amount of production. Globalism has created the problem of narrow specialization of not only large enterprises but even cities and countries. Detroit (United States) – machinery capital of the world before 1980, Columbia - 15 % of all of the world's coffee is grown in this country, the coffee business is the main item of the country's economy, New Zealand - more than half the country's exports are exports of meat and dairy products. Speaking of international specialization and division of labor, and giving the characteristics of modern international economic relations, it should be emphasized that the specialization and division of labor in the last 20-30

years cannot be limited only to the sphere of production of goods and services. It is much broader and covers the area of capital market, and paper market, providing a variety of services. And multinational companies have played the primary role in increasing of specialization and division of labor in the global market. They have made the demand for loanable funds and various services. [6].

On one hand international specialization provides improving of the living standards of all participants in the process, but on the other hand it makes them extremely vulnerable to any change in the macroeconomic balance. Nowadays there are dozens of ghost towns on the planet, abandoned by residents because of the inability to continue to provide the necessary level of life.

Many scientists of our world are more and more insistent on the need of de-globalization of the economies of the world, reducing consumption made by citizens of the leading countries of the world, the need for development and implementation of technologies to ensure self-sufficiency in production of megacities necessary for a healthy and productive life of citizens.

All of these factors are dramatically influencing on the architectural environment, as it is the only way to provide a balanced coexistence of seemingly incompatible systems, as a buffer and a connection between them. The main task of the city has remained unchanged - to ensure a maximum - possible level of life of the citizens, their safety, and to create opportunities for self-actualization. And we can only guess how the means to achieve these objectives will influence the city and its architecture.

CONCLUSION

Architecture becomes that very environment that is able to write a script to create a scene and organize the play entitled "The Return of Humanity to Nature." Of course, today any man, even the most devoted to the cause of human ecology one, willing to live the life of our ancestors before Neolithic revolution, can be found. Infant mortality, diseases, early retirement, predators and many other factors give confidence that the full return to nature is impossible.

Hense, we are talking about integration of human being together with cities and technologies providing adequate standard of living into nature. The way of architecture in this respect of the problem consideration is still unclear, but first steps have already been made now:

1. Technical. Eco-cities, such as Masdar, Moreland, Curitiba, St. David's, Leicester, Tec-City Gujarat, Calgary, Dongtan New Stupino, Arcosanti and many others. The ideal city for sustainable development have not been created yet, but incessant attempts and scientific experiments make us to expect serious shifts for the better in the nearest future.
2. Ideological. Tens of thousands of virtual projects of ecological architecture published by the mass media are creating a certain image in heads of today's youth. This image tells us how the eco-city of the future should be. Vincent Kollebo with his innovative projects of ecological architecture takes a special role in this movement.
3. Biological. Nowadays turning a city into one ecosystem has become one of the most important topics for thousands of studies of biologists, architects, landscape designers and people who are concerned about their place of living.

REFERENCES

EKOLAR: the complemented strategy of development for Africa and world // Global society: map of postmodern world / editor. A.I. Neklessa / Moscow school of geo-economical and social research. Vol.2. — M.: Oriental literature, 2002. — p. 299 – 322.

Ghirenok F.I. Ecology, civilization, noosphere. - M., 1992 – p. 214.

Shpengler O. Man and technics // Culturology 20th century. M., 1995. - p. 487.

Nazarchuk A. V. Social philosophical over thinking of globalization. M.: Direct media Publishing, 2008. – p. 15.

Trukhachev V.I., Tolokonnikov V.P., Lisenko I.O. Scientific basis of ecological parazitology – Stavropol: ST GAU Publition «Agrus», 2005. - p. 78.

Louri D. I. Is sustainable development sustanable? History and synergy: research methodology / under red. S. U. Malkov, A. V. Korotaev, M.: Mir, 2005. - 260 p.

Rozdevich. N.N. Problems of ecological imperative realization.

http://geo.1september.ru/article.php?ID=200802413.

Samin D.A. Misteries of the universe. Noosphere. http://www.bibliotekar.ru/100otkr/64.htm.

Moiseev N.N. Modern anthropogenesis and civilizational breaks. Eco political analysis. Questions of phylosophy.— 1995.— №1.— p. 3 – 30.