

# Ecological Consciousness and Self-identity in the Context of the Ideas of Synergetics

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**Abstract**—In this article we reviewed the problem of the formation of ecological culture and the relation between environmental and moral values. We showed mechanisms for the formation of a constructive ecological position of society in view of the greening and humanization of modern society. The concept of environmental safety is elaborated. We analyzed the synergetic paradigm of the formation of ecological culture in the modern world. The purpose of the article is to analyze the relation between the concept of ecological culture and the synergistic paradigm of the development of society in order to identify perspective trends for the environmental safety formation.

**Keywords**—*ecology; environmental safety; synergetics; ecological culture; environmental policy*

## I. INTRODUCTION

The modern era is characterized by the growing need to respect the ecological imperative, that means strictly follow environmental laws and restrictions in human activities, and not to exceed the ecological capacity limits of natural ecosystems. The capacity of natural ecosystems is determined by their ability to regenerate seized resources and to restore the main natural reservoirs (air and water basins and lands), as well as the power of the biogeochemical circulation. At the same time, the moral and ecological values, which are very close to many spheres of human activity, are getting of more importance: "the greening" of public consciousness caused a vigorous response of disagreement and denial. There are many reasons for this: ordinary household conservatism - unwillingness to accept something new; and people's carelessness (why bother - over time someone will think something up); and environmental ignorance; and selfish considerations - as though the investments in ecology would harm the growth of production, or undermine the foundations of the consumer society; and concerns of businesses that are wary of the possibility of tax increases due to enhancement of environmental regulations; and narrow professional interests of some experts who for one reason or another did not fit into the mainstream of international environmental studies [1]. However, ecological values function and make sense only in the areas of direct and indirect interaction of the subject and the object of nature. While moral values pervade all relations between the subject and the subject, including relationships mediated by natural

objects as a particular case of mediated intersubjective relations.

The relationship of environmental and moral values characterizes the essence of the requirements and needs arising from the environmental situation. Attitude to nature, therefore, fall into the scope of influence of moral phenomena - conscience, responsibility, duty, etc. This means that ecological relations are at the same time, but in another aspect, moral relations too.

It makes no sense to require a person to comply with environmental standards; if he does not know what situation he is in, how this situation differs from the norm, what consequences cause a violation of these norms, what measures are used to improve the situation, etc. There is no more null requirement, as abstract commands to love nature, to preserve and protect it, not to pollute water and air. In order to act consciously and successfully, a person must know and predict the consequences of his actions: "Thus, the practice of improper environmental management can lead to loss of diversity in protected areas of the Brazilian Atlantic Forest". [2] Unfortunately, this principle is not always applied in environmental activities.

At the same time, knowledge should become the motive of activity, turn into personal beliefs, principles, and attitudes. And these principles and attitudes come from the core values on which the whole culture is built.

The concept of ecological culture makes sense for the activities of only such a person for whom the life of a society (tribe, people, nation, state, and humanity) makes sense. The deterioration of the ecological situation is outraged only by those who have a foundation of life wider than momentary comforts and pleasures, whose existence is not reduced to immediate, narrowly pragmatic goals, but is justified by such goals, for understanding and achieving which you need to constantly step over personal boundaries, feel responsible for the fate of future generations and for the preservation of culture [3].

## II. ECOLOGICAL CULTURE

Humanity has sufficient intellectual potential to save nature and survive the environmental crisis. Even today there are interesting scientific solutions, for example, synergetics.

As is known, synergetic considers non-equilibrium open systems, investigates the patterns of formation of stable structures in them. All natural systems are self-organizing. A person violates the process of self-regulation through his activity. So this way many natural structures disappear from the Earth, which leads to the impoverishment of the biological gene pool. Since synergism is the cumulative effect of several factors, the human factor must be one of the integral elements of the whole system of synergistic effects. It should be natural, planned and be in a certain relationship with other natural factors. In this case, this would lead to the emergence of a new sustainable structure necessary for the human – the noosphere. The formation of the noosphere is possible only in the case when human impacts on nature will be synergistically acceptable [4].

The thesis of the greening and humanization of all social activities is supported by the concept of environmental safety. Eco-safety is such a qualitative characteristic of eco-development, which involves the formation of new types of technological processes, social organization and management, able to solve environmental problems and eliminate any environmental hazards (emissions, lack of resources, natural disasters, etc.). Eco-safety, which should be formed as a result of the formation of the information society and the implementation of a survival strategy, implies a transition to an intensive co-evolutionary path of development as the main form of development. This means that the concept of progress in the old sense of the word gives way to the concept of human security.

The whole system of eco-development directions has not been developed yet. However, some paths are already outlined. At the first stage, it is necessary to solve those environmental problems that are caused by a thoughtless attitude to nature and a violation of existing environmental standards. Conventionally, this stage can be called extensive.

At the second stage of eco-development management, it is necessary to minimize environmental pollution by combining this process with minimal use of any biosphere resource. By the end of the second stage, make the transition to the intensive co-evolutionary path of development.

The third stage is associated with eco-development in view of the intensively-co-evolutionary path and involves solving the issues of harmonization of demographic and environmental problems. Perhaps by that time there will be questions of the development of civilization not only on the planet, but also beyond its borders [5].

Now for mankind the time factor is of particular importance. It is necessary to gain time to change the consciousness of people, move from a relationship built on the principle of "subject-object" to a relationship built on the principle of "man-world". On this path, rather complex barriers arise.

The first of them is moral and psychological. Mankind neither psychologically nor morally aware of the possibility of ecological catastrophe.

The second barrier is the socio-political. The mechanism of environmental policy today exists at four levels: global,

state, regional and local. Unfortunately, it is often only a matter of recognizing environmental degradation in declarations. A decision has been made "think globally, act locally", but far from all countries of the world share these beliefs. Since the solution of environmental problems is political in nature, it is necessary to form environmental awareness among political leaders, in power structures.

The third barrier is the organizational and economic. Solving environmental problems requires huge funds today. Neither the environmental taxes introduction, nor the abandonment of expensive programs and primarily military, will change the situation. Some scientists came to the conclusion that ecological cycles do not fit into market relations (these ideas were shared by E. Fromm and B. Commoner) [6]: environmental, not market, relations should be primary; at the stage of the noosphere complete disappearance of market relations becomes possible. Therefore, serious research is needed on the impact of the market on the environment.

So, by the end of the XX century, it became obvious that man and mankind, who created modern civilization, are an integral part of nature. Any changes of nature inevitably affect the state of humanity. There is a relationship between natural wealth and the pace of human development.

The thesis of increasing the independence of man from nature is clearly wrong. The scale of this dependence increases with the boomerang effect: if earlier a person was dependent only on nature, he now becomes dependent on the changes that he himself makes in nature. People are becoming more and more dependent on each other, becoming not only global, geological (according to V. Vernadsky) force, but also an inseparable one, more and more integrated with the natural environment. Only if humanity makes the ecological paradigm a priority in its consciousness and activity, is it possible to establish a new planetary culture.

### III. CONTRIBUTION OF THE CIS COUNTRIES IN THE FORMATION OF PLANETARY ECOLOGICAL CULTURE

According to experts, the nature of the CIS countries carries a double load: both as developed and developing country. The ecological situation throughout the former USSR is exacerbated by inefficient and outdated technologies, low level of technical culture. Resource and energy consumption per unit of gross national product in the CIS countries are two to three times higher than in Western Europe and the USA and five times higher than in Japan. 42 tons of rock mass is mined per inhabitant per year, of which 13 tons are dumped. Each inhabitant per year accounts for: gas and dust wastes — 0.5 tons, carbon dioxide — 3.5 tons, dirty water — 184 tons. We lose 14% of coal, 28% of chrome ore, 30% of oil, etc. Today in the CIS countries the life expectancy is the shortest in Europe, the disease incidence has sharply increased. We are destroying nature on a scale that is incredible for any civilized country.

It is sad that in addition to the "old" problems more and more new ones arise. For example, according to the latest data, 27 administrative regions of Belarus, Ukraine and

Russia suffered from the Chernobyl tragedy. The potential threat now hangs over a population of about 20 million people. While scientific research is already prepared for the Aral Sea region and only project support is required, and for Central Asia the problem is just correct environmental planning, then for the zone covered by the Chernobyl tragedy, much is unclear in conceptual terms. About 640 thousand people now need constant monitoring, up to 2 million people periodically. The scale of the problem is much greater than after the atomic bombing of Japan.

If we talk about the culturological aspect of the problem, then in the affected areas (the Aral Sea region, Chernobyl, Arzamas, Semipalatinsk, Chelyabinsk, Novaya Zemlya etc.) a certain autonomous subculture is being developed. The fact is that the results of the work of the inhabitants of the disaster area are polluted. This applies to livestock products, crops, etc. People outside of these zones treat them with suspicion. Labor results become inhumane. The problem of immorality of labor arises, which is completely new to world culture. And this population of the affected areas forms a new pattern of thinking, alienating themselves from other members of society [7]. They gradually develop "their own" customs and values according to the principle "we - them". Moreover, "them" are understood as something alien, hostile. While it's not too late we need to pay close attention to this phenomenon. This kind of situation can cause an explosion of social tension where no one expects it.

In general, within the CIS, there are three possible scenarios for the development of events, and therefore solutions to an environmental problem.

Optimistic - within the CIS all religious and national conflicts are resolved, economic reform is successfully carried out everywhere, the environmental version of the Marshall Plan is being implemented in all countries. The basis for such a forecast is the act adopted by the CIS "On the principles of environmental safety in the CIS countries". Unfortunately, this scenario is far from its implementation.

Pessimistic - the CIS becomes a destabilizing factor in the world, disintegrates as a union of states. Every country tries to survive on its own. This option is also illusory, and besides, dramatic.

Realistic - the idea of integration works in the CIS space, new interstate formations are being created, the "green" views are gaining weight, environmentalist parties are becoming a noticeable political force, a compromise is found between economic and ecological stereotypes, environmental education and education are emphasized scientific basis, which contributes to the formation of environmental culture of CIS citizens [8].

#### IV. SYNERGETIC PARADIGM OF ECOLOGICAL CULTURE

The very need to study dynamic processes in various systems, including culture, has given rise to a new scientific direction, called "synergy". Its founders were the Belgian physicist of Russian origin, the Nobel Prizeman in Chemistry Ilya Prigogine and the German physicist G. Haken. I.

Prigogine applied mathematical methods to describe thermodynamic non-equilibrium processes.

Synergy destroys many of our usual ideas, strikes with unusual ideas, and provides an opportunity to see the world in a new way, to reveal the mechanisms of social and cultural changes. The application of synergy to the understanding of complex phenomena of cultural development is, of course, the nature of a hypothesis that goes beyond the mathematically rigidly proven. However, this, in our opinion, is quite legitimate, since under the shell of various hypothetical constructions there remains a rigidly proven core of the theory, derived as mathematical theorems [9].

According to the ideas of synergy, culture appears to us as non-equilibrium, open, non-linear, self-organizing system. The openness of the system means the presence of sources (inputs) and drains (outputs) in it, the exchange of matter and energy with the environment. The environment acts as the carrier of various forms of the future organization, the sphere of polyvariant ways of development. Moreover, the drains and sources take place at each point of self-organizing systems, that is, the exchange processes occur at each point of the system: some substances or energies are constantly flowing in and products of the exchange are diverted. Every culture has a kind of circulatory system - its communication network (system of communication lines, ways of moving and distributing political, religious and other spiritual impulses, social and material resources), which provides a certain state of its vital activity [10].

The openness of the system is a necessary but not sufficient condition for its self-organization: not every open system is self-organized or builds a structure. For this, it is necessary to have two opposite beginnings: the beginning, creating the structure, increasing the heterogeneity of the structure due to the action of the source (order); and the beginning, eroding, dissipating heterogeneity (dissipative beginning, chaos).

If a dissipative (scattering, cutting) start is stronger than the buildup (creating structures), then in this mode new structures cannot arise. However, in the complete absence of dissipative processes (dissipation), the organization also cannot arise, since exactly these processes bring the system to the attractor, that is, the trend of structuring the system. The struggle of these two principles makes up the internal mechanism of the formation, restructuring, completion, unification and disintegration of complex systems.

Moreover, in the processes of self-organization ambivalent nature of chaos is revealed. On the one hand, chaos is destructive, since complex systems react very sensitively even to small chaotic fluctuations (deviations). On the other hand, chaos is constructive, as it serves as a mechanism for bringing the system to development attractors, a mechanism for changing various modes of this development, and also a mechanism for coordinating evolution rates when combining simple structures into complex. The presence of these two principles (order and chaos) in the system makes the system non-equilibrium and unstable.

The nonlinearity of the system means the multiplicity of ways of its evolution, that is, when the change in the parameters of the system is above critical values, the system is structured in a different way. With an increase in the concentration of the control parameter, it goes further and further from equilibrium. With a certain critical value of this parameter, the system reaches its stability threshold. At least two (or more) possible directions of development arise. This critical value is called the bifurcation point (polyfurcation). Thus, if the system has exceeded the critical value of the parameters, then the mode of its movement changes qualitatively, it falls into the region of attraction of another attractor (a different tendency of self-structuring, self-organization) [11].

Getting into the field of attraction of a certain attractor, the system inevitably develops towards this relatively stable state, towards this structure. That is, no matter how paradoxical it may seem, the future state of the system "attracts", changing, shaping and organizing its present state. Thus, it can be stated that the future delays the present. Moreover, I. Prigogine stresses that randomness and individual small fluctuations (random deviations) can play a very significant and even decisive role in the fate of the system near the bifurcation points. Calling the state of the system near these points (when the system seems to make a "choice" of a further path of evolution) instability, Prigogine presents random deviations (fluctuations). That is, near the moments of bifurcations, opening the polyvariance of the development of the system, chance plays a crucial role. Thus, it is "nonlinearity" that is the fundamental conceptual node of the new paradigm of thinking.

In the same system, different structures arise, which are different ways of its evolution (attractors). We can expect a qualitative change in the process, including the complication or degradation of the system. And this happens as a result of the self-development of processes in it.

In addition, non-linearity allows at certain stages ultrafast development of processes. Such autocatalytic processes are observed in the biological, social, and economic systems (for example, the, "economic miracle" of post-war Japan, the modern development of South Korea; another vivid example from the field of economics is the phenomenon of rapid capital growth: "money makes money", "Capital for capital").

Given this understanding of dynamic processes, it becomes clear that such complex systems as culture cannot be imposed on their development paths. Obviously, the traditional approach to the management of complex systems, based on the idea: the controlling effect - the desired result - turns out to be wrong, and even harmful if it opposes its own tendencies of self-development of complex systems. The problem of management in the light of synergy comes down to the need to understand how to contribute to their own development trends, how to develop systems along these lines [12].

Synergy forms the idea of alternativeness, polyvariance of the development of complex systems. This potentially gives the opportunity to choose ways of further development of culture, and such that would correspond to the interests

and goals of mankind and would not be disastrous for nature. Despite the multiplicity of evolutionary paths (development goals), at the bifurcation points, a certain predetermination of the processes is revealed. The current state of culture is determined not only by its past, its history, but is also built, formed from the future. Applied to a person, it is conscious and hidden subconscious attitudes that determine his current behavior.

Synergy opens up new management principles for complex systems, where the main thing is not power. Small and properly organized actions are more effective. Similar ideas were expressed thousands of years ago by the founder of Taoism, Lao Tzu: the weak overcomes the strong, the soft overcomes the hard, and the quiet overcomes the loud.

Science has accumulated a large number of facts indicating that "reversibility and rigid determinism in the world around us are applicable only in simple limited cases. Irreversibility and chance are no longer considered as an exception, but as a general rule". [13]

It is precisely two opposite beginnings of "order" and "chaos" that cause the flow of social and cultural processes. On the one hand, state structures, on the other - dissipative processes, manifested, for example, in the growth of crime and terrorism. On the one hand, the search for models of economic planning, on the other - the elements of a market economy.

## V. CONCLUSION

When studying a changing, developing, unstable world, it becomes clear that without instability there can be no development. So Prigogine argues that "modern research is taking us further away from opposing man to the world of nature ... instability in a certain sense replaces determinism today" [14].

Instability does not always turn out to be "the evil". It can also act as a condition for dynamic development, since only an unstable, non-equilibrium system is capable of spontaneous self-organization and development: "in a deterministic world, nature is controllable, it is an inert object, subject to our volitional aspirations. If nature contains instability, as an essential element, then we must respect it, because we cannot predict what might happen" [15].

It can even be said that equilibrium and stability are a kind of dead end of evolution. Thus, development is instability, since it is possible only through instability, chance, and bifurcation. The stability of the world and culture is only relative; it is possible only at certain (even long) stages and to a certain extent. Reaching its extremely developed state, complex systems acquire a tendency to decay. The emergence of a new inextricably linked with chaos, instability and randomness. Any stability sooner or later turns into instability. Stages of appearance and decay, equilibrium and instability replace each other. When dissipative processes are weaker than source operation, the system enters self-structuring mode, which keeps chaos in a certain form. But since the developed structures are very

sensitive to chaotic fluctuations at the micro level, they inevitably eventually begin to decay.

Synergy provides a fundamentally new understanding of chaotic processes, characteristic of all spheres of social and cultural life, as an implicit potential ordering, ability to self-organization. These trends are implemented in unpredictable in advance bifurcation points, passing through which the culture dramatically changes its mode of movement. Despite the fact that a social and natural complex is a super-complex system randomized at the element level, despite the fact that it behaves differently at every point, synergy research suggests that the social and natural complex can also be described as a non-linear open system of a relatively small number of fundamental ideas, and even, perhaps, mathematical equations, which will determine the general tendencies of unfolding processes in it. This allows us to hope that soon mankind will find the keys to solving the problems associated with the threat of environmental disaster.

If in the XIX century biological science acted as a constructive basis for the worldview (on its basis, for example, evolutionary and organistic views on culture were formed), today mathematical models developed in the framework of synergy play a similar role. They dispel the obsolete myths and introduce a new understanding, talking about the possible behavior of complex systems (including culture) and possible ways to manage them.

An objective prerequisite for the formation of a new ecological culture, close cooperation in solving an environmental problem is the fact that the biosphere itself is one within the Earth and space. The resources of the world's oceans, atmospheric air, the water cycle in nature, animals migrating across state borders, fish movements in rivers, seas and oceans - all this is a natural basis for the cooperation of states, their vital necessity. Therefore, the entire world community should unite its efforts to prevent an environmental disaster. In this regard, environmental education becomes one of the most important tasks of our time. In many ways, solving environmental problems is political. The future of all mankind will largely depend on the skill and will of the politicians of the modern world, on the level of their ecological culture.

There are two main points of view on the development of a global community. According to the first one, "the prospect of mankind is its autotrophy, i.e., independence from Nature, based on the artificial circulation of substances and "the second nature" created by man (K. Tsiolkovsky, V. Vernadsky). Another point of view is even more utopian and even dangerous: man must fit into natural biosphere cycles. But this is impossible, because vital activity and the "meaning" of human existence just involve intervention in natural processes, transformation and use of the energy of the biosphere.

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