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THE GLOBAL PROBLEMS OF MODERN HUMAN ECOLOGY

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The global problem of modern education is to form a person that is of full value and possesses highly developed social and personal intelligence. The person that is able to find a compromise between private “I” by Maslow and social “We” by Gegel; that adequately appreciates both itself and another person; which motto is “I am free as long as my freedom doesn’t do harm to the other’s people freedom” can be acknowledged as the ideal person. It is understood that it’s impossible to become ideal, but why just not keep trying? Our further evolution is unthinkable without moral large-scaled ecological education that includes such disciplines as human ecology, dwelling ecology, regional ecology etc. The concept of the Earth cover as a sphere, that was put by Austrian geologist Zuss and completed by Russian scientist Vernadsky, became classical. Human ecology as a science must be based on the concept of health that is complex in its definition. It includes not only physical health of a human, but also his moral, psychical and matter conditions that all together form the sphere named “human ecology”.

It is proved that one human appreciates another one accordingly to his own abilities. Primitive human tries to adapt a more complex person to his level and thus tries to make that person more primitive. By analogy with this simple example he tries to appreciate his environment, too. He has no doubts in that everything around exists only to satisfy his own needs. On the other side, those who adequately appreciate themselves are able to appreciate the others more adequately and don’t try to think by patterns.

Those who are adequately appreciate themselves and all their surroundings are just unable to do harm to their environment – house, city, region, country and the whole planet. Understanding the value and uniqueness of a human life and human relationships is the way to harmonious natural resources exploitation. If we will continue to be harmful to our environment, the ecological crisis will go deeper. Mankind is coming to a deadlock by itself. Planet resources are not endless, mankind is already contradicting with its environment. Separating himself from the nature, trying to just satisfy himself, a man is acting like a virus, destroying not only his own environment but also himself. We can see this looking through the history of a mankind: wars, conflicts, mindless exploitation etc. The main role in this self-destructions are played by the governments because they make decisions for all their people. Our leaders must be more socially and intellectually developed, they must show the example for their people, they should remember that “the real intelligent man is that one who stays intelligent when he is alone”.

Modern people should understand the simple truth: there is no existence out of the nature. The changes in the natural system inevitably result in the changes in our society. Vernadsky talked about the mankind as geological power that is able to change the Earth’s surface. His theory of noosphere – the sphere of intelligence – is a result of his care for the future and for the development of a mankind. There is a necessity to form ecological mentality in people’s minds independently from their nationality, location, job, interests and culture.

Soils, water and atmosphere pollution by industrial toxins, fluorides and pesticides are the real problem because the mankind is a part of the environment. Protecting and restoring soils is only a part of the problem and is a very important task because all toxins or their combinations in the soils inevitably get in our organism.

The soils of Irkutsk region are significantly different. They are forming in the conditions of the influence of the rocks spreading under them, different relief types and climate conditions. In the general agricultural areas there are the following soil types: grey forest (38,6%), carcareous, soddy podzolic, chernozem (5,9%), meadow and bog soils. Grey forest soils are located within mastered territories, mainly in Irkutsk, Usolye, Cheremkhovo, Zalari, Zima, Tulun,

Kuitun, Nizhne-Udinsk and Taishet regions. Carcareous soils are mainly located in Ust-Orda Buryat region, Bratsk, Kachug and Ust-Udinsk regions, they are very fertile. Soddy podzolic soils are located in taiga and subtaiga zones that are characterized with low fertile and are rarely used in agriculture. Chernozems are highly fertile soils with large content of humus; they are located in steppe and forest-steppe regions [1].

Effective functioning of the whole nature protection activities system is impossible without geoinformational systems (GIS) that allow monitoring, processing and analyzing the data, damage evaluation etc. At present there are a few of GIS in Irkutsk region, such as "Baikal" and "Irkutsk region". In the ecological subprogram of GIS "Irkutsk region" the different map making method is developed, i.g. population disease, atmosphere, water and soils pollution. Basing on that data a complex medical-ecological map of the south part of Irkutsk region is made.

Unfortunately, instable economics and insufficient technical and financial means do not allow carrying out the activities targeted to restore soils. There are also no reliable methods that allow to adequately evaluate and predict the consequences of different influences on the soils taking into account its spreading on the surrounding areas.

The Irkutsk regional office on hydrometeorology and environment monitoring observes soils pollution near the industrial cities of Irkutsk region. They define the following toxins: lead, manganese, chrome, nickel, molybdenum, tin, vanadium, copper, zinc, mercury, cobalt, sulfates, and measure pH in the soils. They observe the atmospheric sediments, snow cover and soils fluorides pollution. They inspect soils to define oil products and pesticides.

The criteria of soils pollution is the highest permissible concentration (HPC) of a pollutant. If there are no HPC defined, the pollution level is compared with ambient level or with soils clarkes. Clarke is the percentage of a chemical element in the Earth crust named after F.U. Clarke.

The technogenic soils pollution is at highest level near the industrial enterprises, big cities and roads. The main sources of soils pollution are gas-and-dust emissions sedimentation and sewage dumps. Besides, heat energy enterprises are the sources of ash dumps. On 10.01.2000 there were 26.759 hectares of breached lands in Irkutsk region. These negative activities are anthropogenic, and they result in soils degradation and total lands pollution.

Analyzing the soils pollution data for the period of 10-15 years we can't evaluate the real ecological-economical damage to the Irkutsk region soils. The modern ecological activity does not pay attention to pollution spreading and to the interference between different pollution types. Though there are many methods to evaluate the ecological damage to soils, atmosphere and water, unfortunately, they are not appropriate because they don't take into account the

physical properties of time: time density – the rate of space organization, and time pace – the speed of transforming a cause into a consequence.

We suggest to apply the new author's method [2] of ecological-economical damage evaluation. The formula of the method is:

$$E_V = \frac{C_{dam} \cdot S_{dam}}{100 \cdot S_{gen}^n} \cdot R_{com} \cdot T_{max} \cdot \left(\frac{1}{Sc} \right)^{n-1}$$

where S_{dam} – breached lands area; C_{dam} – breach rate; S_{gen} – total area of a level; R_{com} – the number of breached relations in natural system; T_{max} – component's life time; Sc – scaling factor; n – level number.

Replacing the C_{dam} by HPC we obtain the formula for soils damage evaluation:

$$E_V = \frac{HPC \cdot S_{dam}}{S_{gen}^n} \cdot R_{com} \cdot T_{max} \cdot \left(\frac{1}{Sc} \right)^{n-1}$$

Thus, changing the formula, we can also evaluate water and atmosphere damage. After that we can evaluate the complex environmental damage and define the interference areas. This will promote the harmonious exploitation and, accordingly, the preservation of a mankind.

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THE TIME-SPACE METHOD OF ECOLOGICAL DAMAGE EVALUATION

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In view of high anthropogenic pressure on environment the new approach of complex ecological territory evaluation should be found. Surrounding spaces are multi-sided, and mankind influences on the environment at local, regional and global levels. Frequently something that is useful for a group of people is harmful for the environment. And the environment is a dynamic system that has many external and internal factors.

The Federal ecologic, technologic and nuclear inspection service's board resolution dated 02.04.08 states the following. During the last decades intensive