

**CARTOGRAPHIC INVESTIGATIONS OF THE PROBLEMS OF ENVIRONMENT IN UKRAINE.**

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The report contains methodologic bases of the problem (ecological) mapping, the results of making the complex of the structural graphic models of the objects of the research (society - nature, environment - recipients of its influence), terminology, classifications of the ecologic maps, the structure of the oriented by problems atlases, series of ecologic maps, theoretical models of the legends of the maps of new types.

**1 Cartographic Researches Is the Basis of Cartography as a Science.**

The scientific school of cartography on the basis of the Department of Cartography of the Institute of Geography of the National Academy of Sciences of Ukraine has been created in the course of 30 years in Ukraine. One of its main directions is the investigation (with the aid of cartographic modelling) of the system "society - nature" and the problems arising during the interaction of its elements. The introduction of the concept "cartographic investigations" into the scientific terminology has been caused by the research functions of cartography.

This notion includes: precartographic system regulation of knowledge about the object, classifications of its characteristics and connections, territorial organization of the investigated object as the system - original for its cartographic modelling; theoretical scientific working out of the cartographic model; its practical making and using it for obtaining new knowledge about spatial - temporal regularities or peculiarities of the object. Due to the cartographic researches cartography gets to know new objects and phenomena; the latter gives it the status of science.

**2 Methodology of the Problem Mapping and Its Ecological Branch.**

Cartographic investigations of the problems of the environment have undergone 3 stages of the development. The first stage is stipulated by the study of the problems of environment, the second one - by the study of the problems of nature exploitation, the third stage - by the study of ecologic problems. As a result the special scientific methodology of cartographic investigations of actual problems has appeared. Its bases are elucidated in [ 1,2 ]. The system approach to the object of cartography and its modelling takes an important place in this methodology. When the question is in the problems of environment it's rightful to put question about the recipients of its influence and the system within which the problems arise. The

ecologic system (alive organisms and their environment) which is considered in the large system "society - nature" is subjected to cartographic researches. The elements of the large system and their interaction define the conditions of the existence of the ecosystem and factors influencing it, which constitute the reason of the rise of ecological problems. While modelling such a complex object of research the central place belongs to the problem cartography (quite new direction in the subject cartography), the aim of which is the cartographic reflection of problem situations appearing in the geographic space of the system "society - nature".

The tasks of the ecologic branch of the problem mapping include: the reflection of the state of the natural components of the environment, violation of them caused by the influence of technogenic and other factors; the sources of this influence; the state of different groups of alive organisms (people, animals, plants, microorganisms), influenced by the environment which had been changed by technogenesis, localization of both unfavourable and favourable economic situations, regionalization on isolated ecologic problems and their complex, the reflection of the directions of solving problems in the regions. The realization of these problems presupposes the use of auxiliary means of modelling.

### 3 Structural Graphic Modelling of the Object of Research.

At the pre - cartographic level of investigations we apply the structural graphic method of modelling. The creation of the structural graphic models of the object of cartography as the "system - original" allows to present graphically its structure, relations between the elements within the general system "society - nature".

We have practically worked out different variants of such models (theoretical models of the system "society - nature", its separate elements and subsystems). In the result of the structural - graphical modelling the necessity to regard environment in relation with the recipient of its coercion (classes of alive organisms - people, animals, plants, microorganisms) was established. Within the system "society - nature" structural graphic models of the subsystem "environment - recipient of its coercion" reflect relations of natural and socio - economic elements of the environment, factors changing its state, consequences of the influence of the environment changed by the technogenesis on the people's health, the state of biota (plants and animals), means regulating relations between surroundings and recipients.

The model of the complex of problems arising in the course of the interaction between society and nature is worked out. The place of the problems of the social development, the general problems of interaction, demo - (antropo -) ecologic and biota - ecologic, ecologic - economic and social ecologic problems is defined in this

model. The diapason of the application of such models is very wide. Their main function is to regulate the ideas about the structure of the investigated object and its essential relations. The spheres of its application are: theoretical (for working out classifications of maps according to the objects) and practical (for working out the structure of the complex cartographic models).

#### **4 Classification of the Ecologic Maps.**

We've worked out the classifications of the ecologic maps on the basis of structural graphic models. The first classification corresponds to the scientific directions in which the cartographic method in the study of the problem of environment is applied. The space - ecologic and ecologic - geographic classes of maps, subdivided into natural, social - ecologic, ecologic - economic consisting of component - branch and territorial complexes, factual, estimating and integral, are pointed out in the structural model. The system of ecologic maps, which should be worked out in the process of cartographic researches of the considered object, is presented on the second classification model.

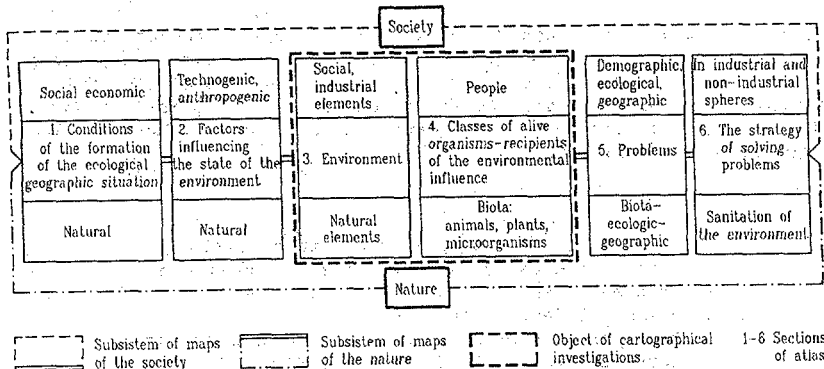
It determines the themes of the maps in correspondence with "the tree of aims" of cartographic investigations. Levels of the "tree" upwards are: initial maps - "surroundings", "people"; factors changing surroundings are preecological; monitoring maps (parameters of surroundings and people's health) are the basis of renovation of information about the changed ecological situation; the maps of estimation of the quality of surroundings and people's health, economic and ecological damage caused by economic activities; maps of zoning according to the complex of ecological problems, integral ecologic zoning; maps of conflicting situations (both at present and in future); the maps of the strategy of solution of the ecological problems, recommendations regulating social and economic development of districts, the maps of measures on sanitation of the environment and people's health protection.

Structural - graphic modelling and classificational constructions constitute a theoretic stage of cartographic researches.

#### **5 Cartographic Realization of the Results of Researches.**

Structural - graphic models and the classification of ecologic maps are widely approbated during the elaboration of structures of atlases (exploitation and protection of nature, medical - ecologic atlas; ecologic - geographic atlas for Ukraine), system regulated series of maps intended for planning measures on environmental protection in the administrative district, the atlases reflecting radioecological situation in one of the administrative districts in the area polluted in the result of the catastrophe in the Chernobyl Atomic Station.

Figure 1. Structural graphic model of the Ukraine's ecological geographic atlas



Structural - graphic model of the ecologic - geographic atlas of Ukraine (fig.1) shows its main sections, the elements both of nature and society being pointed out in every section. The principle of the clear orientation of the themes of the map onto ecologic problems and the reflection of the connections of the elements of the studied system - original in the legend is the main principle in working - out themes and contents of the maps of all atlases and series. While choosing the indices of the state of the environment the basic approach was a demo -(anthropo -) centric one. The narrower the specialization of the atlases or their territorial scope were, the more concretely the themes of maps and the parameters of the mapped objects were defined.

In the process of cartographic researches the terminology was regulated. The definitions to the following terms were given: ecologic - geographical researches, problems, situations, ecologic mapping, ecologic maps, ecologic regionalization, ecologic security, risk of existence, ecologic capacity of the territory, stability with respect to the technogenic loads, ecologic structure of the territory, ecologic skeleton structure, conflict ecologic situation, ecologic policy and strategy. The systems of the indices of the state of the environment, their essence and providing with information, levels of the organization of monitoring were researched.

Experimental - practical working - out of various cartographic works, considering the ecologic problems, afforded the opportunity to make theoretical models of the legends of maps on new themes and separate maps of new types. For example the basic types of ecosystems in accordance with the types of nature management were pointed out in the works about Donetsky region; the new monitoring series of maps of the results of radioecologic control of the situation was included in the Atlas of Polessky region.

To sum up it should be noted that the methodologic grounds of the cartographic research of the problems of the environment, deep theoretic study of the initial data of the object and its future cartographic model constitute the foundation of the practical works directed at the working out new cartographic works, they develop science, enrich practice.

#### Reference

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