

REGIONAL SERIES OF THEMATIC MAPS FOR MAKING INFORMATION SYSTEMS OF NATURE USE AND ECOLOGY

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Abstract

The experience of setting and solving the problems of information support of nature use and ecology systems on the base of regional thematic maps series is illustrated in this report.

1. Introduction

Thematic maps made on the base of space data depict the most vivid picture of geography. Closely conjugate information obtained from space materials intensifies the system representations on natural unity of territory and its peculiarities, characteristics thereby revealing the multi-dimensional connections of the natural elements with each other. These direct and indirect connections assist to extend the knowledge about the nature of mapped objects, to increase map contents.

The photographic survey from the space is a massive information source widely used in cartography. A new cartographical technology - complex thematic mapping and studying of natural resources has been formed on its base in Russia; the said technology is directed on to meet the information requirements of managed territories and regions. Series of thematic maps are the main product of its development. Series of natural-resource maps are the most urgent and vital of them; they characterize the latest conditions of natural resources, the degree of its use with taking into consideration the anthropogenic influence on the environment. Series of maps are made frequently in a operative-intensive mode by methods of the "Priroda" State Centre; they are the source of regional complex information orientated towards the support of solving the most difficult territorial tasks connected with designing, planning, forecasting and managing the nature use.

2. Region: territory and environment

The region outlines the zone of influence of its territory by different criteria. They are changeable quite often in time and space. Political boundaries within the framework of which the functions of managing the territory are performed by centralized means are usually considered as a base. Political, climatic, historical and other environmental boundaries are co-existing independently with regional boundaries; they are subjected to changes under the influence of the region policy. A space photographic image reproduces the correlation of concrete features of the environment and geographical area by documentary and impartial means, without bright colours and exaggerations.

The environment is the key meaning component of geographic data of region. Space photographic image records the arrangement of different kinds of environment, localization and spatial combinations. Nature use and protection of environment affect not only just its consumed resources (forests, minerals, resources of fishery and hunting) but also permanent components of nature (relief, microclimate, water regimes and even the tectonic activity). Economic relations through the infrastructure, cultural-historical connections, social-ethnic structures are interlaced with naturally stipulated connections that affects the results of the land use of region.

Not all of the environmental factors are interpreted on the image and introduced into the map contents. But all they anyhow educate an author of the map which obtains and additionally uses some other sources of data so that a map or series of maps would become more informative for public. Regional factors are acting continually. It is necessary to take them into consideration, it is necessary to know them in order to take them into consideration. A map and image assist in this. The map is an ultimate product which has grown on the local data ground. But so it is necessary to know well the ground and product in order to prepare useful information.

Regional orientation is a reliable landmark. We see more clearly the target - regional information support for its stable development. The way to it leads through economy, resources. It's not necessary to talk about it. Resources and, first of all, their natural component are the base of life of society, the basis of its might and prosperity. Natural resources are the most important dominant of region. Great attention is always given to their study and use. Today it isn't exception from the rule. The methods which we apply for their knowledge - the remote sensing - are the urgent methods which form new ideas.

3. Setting the tasks of cartographic support

Map is an especially information product; many people need it; many people can know nothing about it. All is dependent on the theme. A theme of map attracts the users. Series of maps sharply extends this range. It allows to extend and deepen the information space, to designate the list of solved tasks, to make the prerequisites for setting new problems and to conserve or to increase the resources of region.

Setting the tasks of cartographic support comes from the region; it requires much efforts on revealing and studying them. Practically it is important to know what kind of information is necessary and who needs it today, who will need it tomorrow. The information is evaluated by the criterium of day. This is urgent, what is today; it is more important, what will be tomorrow. How find out it, how make it. Really only a map's author can make it. Space information is a special information; it requires special regulations of its formation, special knowledges and regularities of its transfer.

A regional program of cartographic support is arisen at the end of such research. But it then appears that each map is faced with many problems, but a lot of them is risen for series of maps.

4. Sources of information: receipt and transformation

The data of space photographic surveys are the main source of receipt on information for developing the contents of thematic maps series. All they are obtained by Russian satellites with the aid of KATE-200, KFA-1000, MK-4 photographic cameras as well as by MSEU-1, RSA-station and Almaz scanning systems. The materials received on the Earth are initially processing - rectifying, filtering, enlarging; after this they are offered for thematic interpretation. Interpretation of space data used as an original source of thematic scene of a map is carrying out on a broad background of geographic connections revealed on the base of landscape-indicative method. Main parameters and signs of geographic objects, processes and phenomena are identified on an enlarged geimages with sufficiently high resolution (5-8 m). Using the System of interpretative signs the information signals are transferred on the scheme of interpretation with cartographic mount of the topographic bases and are analysed in accordance with the design of a legend of thematic map.

Subsequently obtained data are once more analysed, verified and supplemented by other sources; they are become by preliminary map with a network of boundaries of thematic properties and signs of mapped objects. The design of thematic classifier is developing and verifying in parallel; the said classifier should have available signs and characteristics of information properties of a mapped object for digitizing a map and making its analog in electronic version. But this process is carrying out after editing the author's model of map in order to avoid unnecessary alterations.

At present time maps of different contents are developed with the aid of space data. Natural-resource maps are the most urgent and vital; they represent the state of natural resources of territory, the degree of its use and the signs on up-to-date development with taking into consideration data of anthropogenic influence. Such maps are making in rapid mode. It is profitable for territories of intensive economic development which are undergoing the information insufficiency or necessity in rapid revision on a series of parameters of the conditions of environment and ecological situation.

The technology of complex thematic mapping by space data with additional use and control of data obtained by traditional methods has a high economic efficiency; it can be used for studying any territories.

System and highly conjugate information obtained with the aid of thematic maps series is oriented on solving practical tasks: 1) revision of data on natural resources or group of resources of the same kind; 2) distributed analysis of complex of information by territory (territorial information); 3) transportation of thematic layers of information in comparing them or superimposing one on other in a process of supplementary analysis and receipt of new information.

Thematic study of sectoral subsystems of territory by remote sensing exclusively carries out in the aims of more deep knowledge of its peculiarities and characteristics of natural-resource properties and ecological factors.

5. Solving of nature use and ecology tasks

Main directions of information flows in thematic mapping CSMNR series, providing the relative completeness of ecological potential data of the territory are the next:

- 1) characterizing of natural-resources links of the economic spacing, zones of main industrial technology cycles influence on environment components;
- 2) detailed monitoring of natural dynamics parameters of environment and forming of territorial forecasting elements on its basis;
- 3) providing of nature-conservation tasks solutions with regard for optimization of ecology factors of environment;
- 4) organization of ecological monitoring of environment or local control of selected main object conditions;
- 5) planning of conservation and restoration works for localization of dangerous and unfavourable phenomena and processes.

At the same time a lot of users of territorial information already now take an interest in its using in the form of completed thematic maps data with more profound and intensive study.

Data of series of thematic maps are efficiently used in preparing numerous decisions of scientific and practical tasks of region's nature use and ecology. The developments that carried out on their information base are oriented on making:

- 1) schemes of rational arrangement of productive forces;
- 2) plans of development and improvement of agricultural objects;
- 3) distinguishing the idle natural resources;
- 4) schemes of district plannings;
- 5) localization of dangerous and unfavourable processes and phenomena;
- 6) lay-out of sites for an engineering of economic and dwelling objects;
- 7) ecological control of the environmental conditions;
- 8) planning of nature-protective measures and restoration works, recultivations;
- 9) search and exploration of minerals;
- 10) selecting and designing the optimum engineer and transport communications routes;
- 11) evaluating the prospects of territory development in connection with environmental changes;
- 12) organization and execution of ecological examination at the stages of planning and preparing the territorial technical projects;
- 13) ecological forecast of territory development on the near and far prospects;
- 14) different system projects of studying real life of region including the selection of GIS managing means;
- 15) regional programs of environmental regulation and stability;
- 16) territorial conceptions of nature use, forest use, resource use, economic development based on the environmental knowledge and relations.

There are in reality a great number of solved tasks in which spatial information is used; the above-mentioned list gives only certain and in addition poor and tedious representation about their variety. The information factors which are based on the resources data are the condition and prerequisite of functioning and purposive changes of environment as well as relations. The problem of their using is a problem of the policy and the time.