INTELLIGENT, KNOWLEDGE AND MODEL-BASED CARTOGRAPHIC SOFTWARE FOR SUSTAINABLE DEVELOPMENT OF THE BAIKAL REGION

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Development of a strategy for realization of some conception of sustainable development of the Baikal Region depends to a great extent on the integration of intellectual efforts with real potentials of the territory. It may find its status at law in the form of the Baikal Lake Law in which the Lake may have the status of the Inherited World Value.

The information-analytical support (on the ecologo-economic and geographic basis) with application of computer technologies is the constructive part of this strategy.

The constructivism consists in rather quick analysis of a region state and development of some proposals for removing deviations of this state to the desired one, when the technologic-economic development of the region goes beyond the frames of ecologic restrictions.

An intelligent cartographic-geoinformation system including such three large blocks as (i) knowledge-based models, (ii) different mathematical models of regional dynamics and (iii) an information-cartographic block containing a complex of basic numerical data and integral maps could be the instrument for providing such a support [1]. The regional control requires that a lot of interdisciplinary cartographic-geographic and mathematical problems be solved such as: generalization and spatial extrapolation of geographic regularities revealed by local investigations ; objectivization of differentiation and separation of integral nature-territorial systems, with account of interaction between nature, economic activity and population in a region; determination of the environment-stabilizing, nature-protecting and resource-restoring role of landscape complexes; maintenance of quality and bio-diversity on a territorial natural environment.

The paper discusses a conception of intelligent cartographic software. It is based on application of new information technologies with artificial intelligence combine multi-criterial optimization and computer cartography methods with spatial information generalization in the form of a map legend of some hierarchical structure.

The problems of elaboration of a system for maintaining Baikal Region sustainable development are discussed on the basis of the experience of (i)

development of nature-economic (of inter-branch balance type) and socio-ecologo-economic (econometric type) models for separate parts of the region, and also (ii) the subject and complex cartography.

Controllability of the region with respect to sustainable developmenrt criteria assumes: 1) revealing and analysis of development indicators, substantial factors and restrictions on account of transition to new economic and socio-political relations; 2) analysis of controllability and stabilizability of the process of attaining sustainable development with the help of law, economic and socio-political mechanisms under different assumptions on reachability of resourse-saving technologies, on information support of ecological education and upbringing of population; 3) analysis of dynamic equilibrium stability on the basis of conditions of interaction of nature, economic activity and population of the region - all under the conditions of charged usage of natural resources, compensation of direct and indirect damage to the environment and the population (including that of catastrophes) and maintenance of ecological security.

Concentration of the region's researchers potential will allow us to solve abovementioned problems on the interdisciplinary basis. Furthermore, the geographers' and cartographers' set of research instruments must be the aid for (i) putting forward some ideas and approaches for generating procedures, restrictions and criteria of achieving an optimal trajectory, (ii) ecologo-economic normalization of the damage to the regional environment and climate, (iii) complex monitoring, expertise and forecasting of the state and stability of landscapes, (iv) estimating the natural resource potential and (v) control of usage of natural resources in the Baikal Region.

On the whole, the intelligent cartographic software is knowledge- and model-based because it is based on complex mathematical models, new information technologies, databases, new unique methods of logic derivation and hypothesis generation and computer-aided maps. It will give the possibility to coordinate diverse information, forecast Baikal Region development dynamics under the conditions of multicriteriality, information incompleteness, contradictions of technico-economic and ecologo-geographic criteria, to support management and decision making with estimating the possibility of arising emergency situations due to technogenous and natural factors.

REFERENCES

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