

Methodological approaches to modeling and forecasting of rational use of land resources using geotechnologies

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Abstract. The article discusses methodological approaches to modeling and forecasting the rational use of land resources and the use of geotechnologies. Modeling is performed using the concept of "digital twin" and specially developed criteria for the optimality of the rational land use system. The criteria are reasonable from the viewpoint of assessing the socio-economic condition of the territory in strategic planning, and environmental analysis. The criteria also correspond to the indicators that are used to assess the effectiveness of the cadastral system. Geotechnologies are used as a method of predictive modeling. The prototype of the system of rational use of land resources is proposed. The system consists of four subsystems: zoning and functional zoning; predictive modeling; long-term planning; monitoring of rational land use based on optimality criteria. The structure of the system of rational use of land resources has been developed, showing the relationship between subsystems and targets which are to be reached as the result of system operation. To assess the rational land use system, optimality criteria have been developed: the stability of the spatial structure to external influences; maximum involvement of land resources in economic use; value stability of the real estate object; compliance with regulatory requirements; indicators of the demographic situation; economic efficiency. The implemented structure of rational use system of land resources is the structure of the digital twin model for optimizing geosystem management processes. Based on the developed optimality criteria, more accurately finetuned model and cost-effective and environmentally sound management solutions are developed.

Keywords: modeling, forecasting, rational use of land resources, geotechnologies, digital twin, optimality criteria, territorial management, strategic planning

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