

===== **METHODS FOR STUDYING, MAINTANENCE AND PRESERVING** =====
ECOSYSTEMS AND THEIR COMPONENTS

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**DEVELOPMENT OF THEORY AND METHODS OF MONITORING
FOREST ECOSYSTEMS UNDER GLOBAL CLIMATE CHANGE
(RESULTS OF SCIENTIFIC RESEARCH)**

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The paper examines the prospects for implementing the full triad of geoecological monitoring: observation (state assessment) – control (forecasting) – management (adaptation, regulation). Conceptual principles are proposed for an empirical-simulation method of landscape-ecological forecasting of forest ecosystems, revealing the local and regional mechanisms of their global changes. Paths for developing a new predictive geo-ecological concept, known as “Global Changes at the Local Level”, are substantiated, identifying these changes through an empirically established mapping of the background bioclimatic trend by the catenary system of forest biogeocoenoses, which makes this study a novelty. The ordination analysis of landscape connections aims to identify the transitions of forest communities to critical states based on the main discrete parameters of biological turnover. The landscape-ecological forecast is presented as a system of operations with the ecological (hydrothermal) niches of the studied objects. Empirical-simulation predictive modeling is described as the reproduction of future scenarios of biogeocoenotic systems according to the laws of their basic spatial organization. A methodology developed by the author for quantitatively assessing the resilience of forest ecosystems is presented. The mechanisms of adaptation of forest ecosystems to global climate signals are examined through the prism of their functional resilience to the impact of these signals. The ecological resources of forest cover are described in the biotic regulation of the carbon cycle, aimed at mitigating global warming, as well as in ensuring the transition to adaptive forestry.

Keywords: global warming, forest geo(eco)systems, geo-ecological monitoring, empirical-simulation predictive modeling, forest ecosystem resilience, quantitative methods of ecological analysis, carbon cycle, forest ecological resources, global warming mitigation.

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