



Geocological systems of Europe

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Natural landscapes which were formed during last 10 thousand years as a result of interactions between natural components, such as relief, climate, soils, vegetation and runoff, undergo the increasing and intensive economic development. It causes the response natural-anthropogenic processes which transform the initial natural landscapes. The effects could be negative leading to the degradation of landscapes, neutral or positive resulting in the increased biological productivity of landscapes. These natural-anthropogenic (or present-day) landscapes evaluated in terms of the observed effects are called geocological systems (GES).

GES of Europe (outside the territory of Russia) were studied at the scale of 1:5 Mln. The study included the following stages. 1. A model of natural, natural-anthropogenic and geocological systems has been elaborated. 2. GIS which includes above 28 thousand units in its database has been created. 3. Map of the natural landscapes of Europe has been compiled. It represents 615 landscape units grouped into geographical belts and sectors, zonal types and subtypes of landscapes, classes, subclasses and families of landscapes. Thus the map represents the complicated pattern of the present-day landscape structure of the European territory, its hierarchy and spatial differentiation of natural landscapes. 4. Systems of economic development of landscapes (totally 23 categories) have been identified which transform natural landscapes into natural-anthropogenic or present-day ones. According to the proposed classification of present-day landscapes both GIS and the map show modal landscapes (practically untransformed), derivative landscapes (with transformed vegetation component of landscapes) and several categories of anthropogenically modified landscapes with intensive transformation of their natural structure due to economic activities. A group of technogenic landscapes represents the most profound modification of natural components by urban, industrial and agricultural impacts. It was estimated that at present the area of modal landscapes in Europe is only 47 mln ha (10% of the total area), of derivative landscapes - 56.5 mln ha (12%), of anthropogenically modified landscapes

- 303.3 mln ha (64%) and of technogenic landscapes - 66 mln ha (14%). The results show that the territory of Europe, particularly within temperate and subtropical geographical belts, is dominated by intensively developed landscapes with profound and diverse anthropogenic transformation.

The analysis of natural-anthropogenic processes has resulted in the following areas of landscapes affected by degradation processes: sheet erosion - 256 mln ha (56% of the total area), linear erosion - 108 mln ha (23%), pollution - 136 mln ha (29%), compaction - 139 mln ha (29%), dehumification - 36 mln ha (7%), etc. These values vary considerably within particular geographical belts and landscape zones.

The resulting map of Geoecological Systems of Europe represents natural-anthropogenic processes within the present-day landscapes and the quality of GES, from sustainable functioning to active degradation.