

Landscape Mapping of the Russian Black Sea Coast

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The Russian Black Sea coast with original subtropical landscapes has undergone different anthropogenic impact of recreation, industry, agriculture, motorways and urban areas. The ecological situation is aggravated due to the high concentration of different types of impact in a rather narrow coastal zone and periodic influence of active nature processes such as hurricanes, landslides and earthquakes. Last years the situation became more critical. The strategic plan of development and management of this region should be based on the territorial and landscape planning, on the knowledge of modern nature and anthropogenic territory conditions. Complex landscape studies with detailed mapping must be carried out for this reason. Such investigation has been realized in the region of Abrau peninsula near Novorossiysk. This was aimed at study structure, evolution and modern ecological state of natural and anthropogenically modified landscapes.

The large-scale landscape scheme (1:50000) and more detailed maps (1:25000) on some areas within this region have been compiled on the basis of field observations with mapping and profiling with regular step of investigation (of 20-25m) and remote sensing analysis. Several landscapes with different spatial organization belonging to two main types were identified. The coastal landscapes are characterized by specific and contrast structure due to abundance of seismoslides, and by submediterranean vegetation with rare, relict and endemic species. Unique submediterranean ecosystems – pine-tree forests, pistachio-junipers and junipers open-lands are typical for the coastal zone. Changes of vegetation in these landscapes (living form, height, diameter, crookedness and etc.) affected strongly by the sea, indicate this influence. It turned out that the concentration of Na and Cl are also higher in soils and plants near the sea. Submediterranean ecosystems began to combine with mesophyte forests forming special landscape ecoton on some distance from the sea. They further disappear.

Collected data are being analyzed by methods of multivariate analysis. It turned out that landscapes studied undergo both direct and indirect influence of human activity mainly by chemical pollution. The first type of influence causes the reduction of the biological diversity, including ecosystems with relict and endemic species and expansion of shrubs, the decrease of biomass, the increase of soil disturbances and formation of new landforms and so on. The appearance of pollutants, including toxic ones in vegetation, soils and water can be revealed as a result of the second type of pressure.

The special landscape-ecological map has been compiled for the model areas on the basis of landscape map. All ecosystems, showed on the map were united into 4 main groups according to the character of landscape structure changes. The ecosystems highly modified (with all natural components being changed) are more typical for residential areas, vineyards and coastal recreation zone. The ecosystems with moderate changes occur also in the coastal area, for example some unique ecosystems with pine-tree forests, pistachio-junipers and junipers open-lands. Proportion of pine-tree (*Pinus pitysusa*) forests in the fourth and fifth stages of recreation degradation nowadays accounts for 60%. The study showed the deterioration of submediterranean ecosystems ecological state. Since the majority of landscapes in the investigated region have low anthropogenic transformation or practically unchanged it can be regarded as natural and cultural heritage of Russia and Mediterranean region and as a standard background for ecological monitoring of Mediterranean landscapes.