

Geographical and environmental research of transboundary territories: results and prospects

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Abstract. The study of transboundary territories is an urgent and complex issue of geography since currently there is no well-developed methodology for studying these objects and there are only sectoral approaches to those. The landscape-ecological analysis of transboundary territories with their own characteristic set of relationships between man and nature should be based on a systematic approach that allows the geographical objects with different intersystem connections to be studied. From the point of view of system approach, the object of the study is a set of transboundary systems. In addition, the study of transboundary territories is possible due to the complexity of the study which is based on the landscape theory, the V.B. Sochava's theory of dynamics and evolution of geosystems, methods of ecological zoning.

1. Introduction

In the current context of transboundary territories, the issues of environmental and economic relations in the sphere of nature use become especially topical, since the growing demand for natural resources in a market economy became a factor in the environmental integrity of natural components.

A powerful factor that is currently responsible for the strategic tendencies in the approaches to the regional policy, is the idea of ecologically sustainable development. "Sustainable development" as a concept and as an imperative has now gained recognition worldwide. And nature and environment conservation and preservation are regarded, along with the economy, as equally important goals. For that reason, in most countries, the quest of science- and reliable data-based solutions aimed at sustainable territorial development is therefore considered a fundamental remit of the politics and management.

The transboundary territories within the economic corridor "China-Mongolia-Russia" are distinguished by a great variety of natural conditions and resources. And yet, natural systems as natural landscapes, habitats of living organisms do not depend on state borders and develop in accordance with natural laws. National boundaries are intersected with integral natural and natural resource systems of various types, for example, the basins of the Selenga river [1], and the Baikal natural territory (figure 1). River systems crossing national borders are a classic example of transboundary systems. Bearing in mind the strategic importance, the Baikal region, being a part of the Russian-Mongolian-Chinese transboundary area, is of great importance for the sustainable social and economic development of Russia.



2. Methods and results

V.B. Sochava Institute of Geography SB RAS has a wide work experience in the transboundary territories. Anthropogenic changes of geosystems in the transboundary territory of Russia and Mongolia are researched [2]. Social interrelations in the border areas have been studied, their population is defined as the most important factor of cross-border migration interactions. Russian-Chinese migration is assessed as an essential element of cross-border ties between Siberia and China, the significance of the tourism component of cross-border migration is justified. The Russian-Mongolian transboundary zone is represented as an integral territorial recreational system characterized by a unique spatial organization, a complex of external and internal interrelations and is part of the international tourist space. The tools of landscape planning in solving social and ecological transboundary conflict situations [3]. It is necessary to recognize that in addition to political and economic tasks, environmental problems are attracting increasing attention lately.

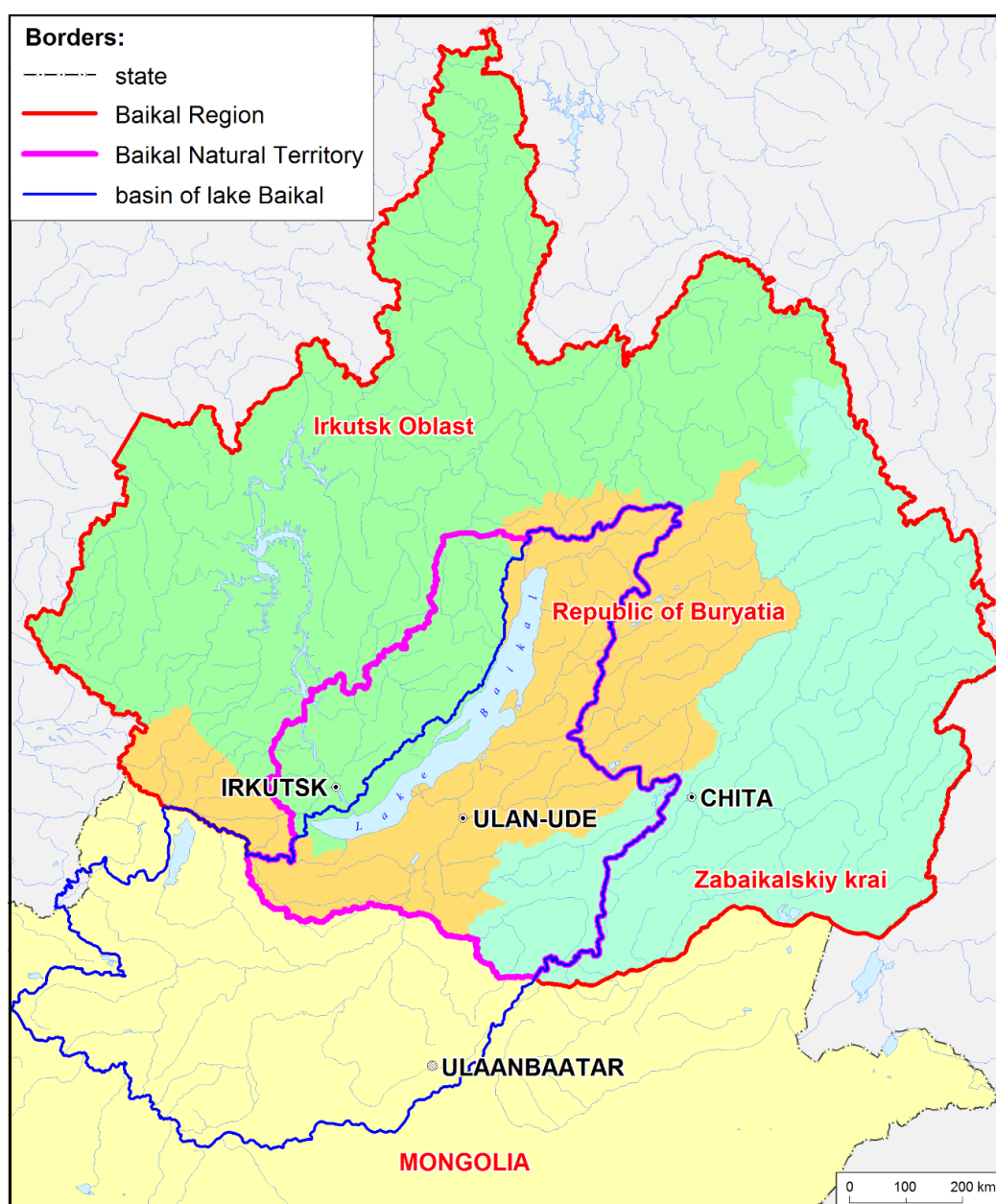


Figure 1. Transboundary Baikal region

There are five major directions of anthropogenic impacts that have negative effects on the ecological systems of the transboundary territories.

1. Intensification of natural disasters. The number of human losses and financial damages from natural disasters has increased notably during the last decades. Earthquakes, tsunamis, hurricanes, floods, forest fires, heavy snowfalls, and others do not depend directly on human actions, but the development of periodically inundated floodplains of rivers, deforestation, leading to a change in albedo, as a result cause thermokarst, solifluction, landslides, and occurrence of ravines. Trimming of slopes in the mountains cause avalanches and mudflows.

Floods occupy one of the leading places among natural disasters. They take place during high water and freshets.

Forest fires are one of the major environmental hazards in Siberia. Fires destroy not only the vegetation, but also a significant part of the animal world, and reorganization of ecosystems takes place. The soil cover is damaged, erosion develops, and desertification of a territory is under way. Places of traditional crafts of the population disappear (logging, hunting, gathering of wild plants and crop).

2. Pollution of natural environments. In the atmosphere of cities, where sulfur and nitrogen dioxides, benzopyrene, formaldehyde, suspended solids, and phenol are transferred with the emissions from industrial plants, thermal power plants, and motor vehicles, in the late 20th century the average annual concentrations exceeded the maximum permissible concentration in 185 cities of Russia [4].

3. Depletion of natural resources. Consumption of resources of the biosphere by humanity (nature management) in the world is steadily growing. Non-renewable mineral resources, oil, gas and coal are being reduced; their extraction is getting more expensive. Many mineral resources have been depleted, others are close to it. In their turn, renewable resources, i.e. fresh water, forests, soils, and living organisms are no longer renewed in the same quality and quantity. Drinking water becomes the scarcest resource. The steppe regions are among the areas poor in water because of natural conditions. In the taiga territories, the problem of their quality is of current concern.

4. Land degradation. In the agricultural regions, a high level of plowing under non-compliance with the soil-protecting technologies leads to land degradation, development of processes of water and wind erosion, desertification, salinization, and pollution with heavy metals and toxicants.

Only on the basis of system research that take into account the common interests of the parties we can deal with such challenges. The current situation requires a large-scale and comprehensive study of the border and transboundary territories of Asian Russia in order to develop the scientific foundations for a program for the sustainable development of transboundary territories, taking into account geographical, ecological, socio-economic and geopolitical factors.

The Baikal transboundary region is a complex region as regards its natural environment and landscape characteristics; it is endowed with immense reserves of various natural resources, the industrial development of which is steadily progressing, thus posing challenging ecological problems. Lake Baikal is a unique and fragile ecosystem, which must be protected and preserved. In connection with the assignment of the status of 'World Heritage Site', the concept of the Baikal natural territory (BNT) and its ecological zones were legally approved in 2006.

Balanced development of any territory is determined by a combination of socio-economic and natural-ecological factors. Disregarding any one of them leads up to an imbalance and disturbance of the development process. For territories having a high natural value, such as Baikal region, taking into account the ecological requirements is a 'must' in connection with what has been said above; at the contemporary stage of development of social and ecological systems, of particular significance is becoming the concept of strategic interrelated ecological and socio-economic territorial planning [5]. This concept is focused on achieving the goal to settle the conflict: economic and social interests – ecological constraints of the territory.

Some explanation is in order as to what is ecological zoning [6].

First, it is a tool for systematization and target-oriented analysis of information about the present status, significance and sensitivity of natural environments and complexes (systematization).

Second, it is a method for assessment of lands in the broad sense, including their geopolitical position, strategic prospects of utilization, and adjustment of the requirements for their utilization in accordance with world standards (comprehensive assessment).

Third, it is a center that assembles - through effective mechanisms of interaction – various agencies and politicians, who take decisions on different levels (management).

Fourth, it is a field for seeking optimal (best-practice) decisions given the competing options of utilizing resources and natural complexes; this is especially true for the conditions of emergent market relations (consideration).

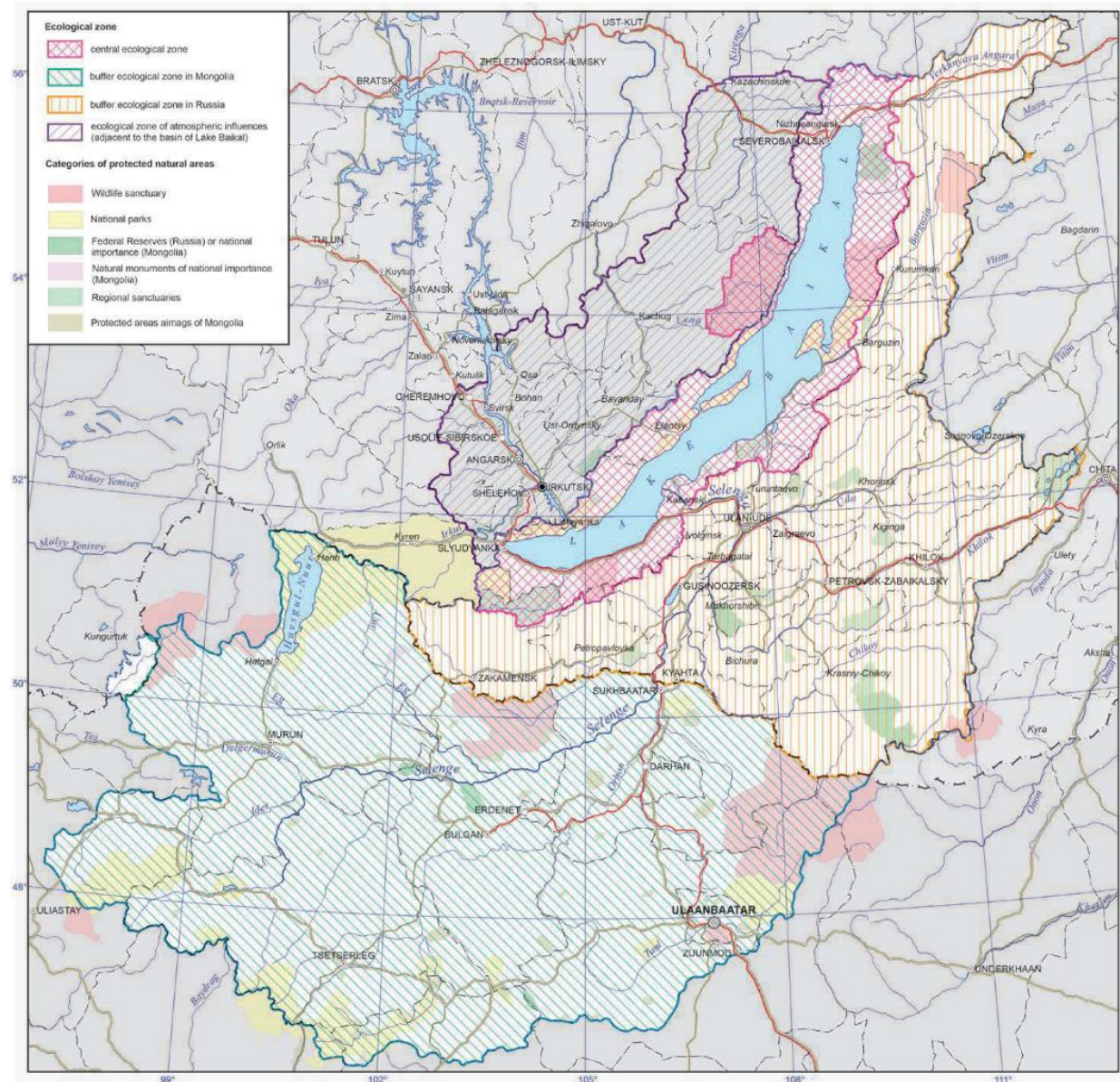


Figure 2. Ecological zoning of the Lake Baikal basin

3. Conclusion

Differentiation of environmental management regimes for transboundary territories should always be based on a comprehensive assessment of the natural basis and consideration of natural processes. The integration of the goals of landscape, territorial and socio-economic planning for the development of transboundary territories should be the development of the most appropriate strategy for optimizing the territorial organization based on ecological zoning (figure. 2), the main purpose of which is to identify the types of ecological territories that to some extent regulate economic activities. Its achievement is possible with simultaneous solution of two tasks: nature preservation and sustainable socio-economic development of the territory, without infringement of the rights and freedoms living of local people.

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References

- [1] Chalov S et al 2017 *Reg Environ Change* **17** 2039
- [2] Belozertseva I A et al 2017 *Water Resour.* **44** 471
- [3] Antipov A and Semenov Y 2006 The Russian school of landscape planning *Environmental Security and Sustainable Land Use - with special reference to Central Asia (NATO Security through Science Series)* ed H Vogtmann and N Dobretsov (Dordrecht: Springer) pp 309-19
- [4] Plyusnin V M 2014 *Contemp. Probl. Ecol.* **7** 597
- [5] Belov A V, Vladimirov I N and Sokolova L P 2016 *Geogr. Nat. Resour.* **37** 129
- [6] Plyusnin V M and Vladimirov I N 2013 *Territorial planning of the Central Ecological Zone of the Baikal Natural Territory* ed I V Bychkov (Novosibirsk: Geo) p 407