

SPATIAL DISTRIBUTION OF LAND USE/LAND COVER TYPES IN THE TRANSBOUNDARY GEOSYSTEMS OF THE SOUTH OF THE RUSSIAN FAR EAST AND NORTH-EAST CHINA

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OUTLINE:

- 1. Methodological approach to the scientific background for territorial land use planning***
- 2. The phases of compiling of land use functional zoning map***
- 3. Features in the spatial distribution of land use/land cover types in the transboundary geosystems and national parts of Amur River Basin***
- 4. Conclusions***

The object of our investigations is Amur River Basin.

The main goal of investigation is creation of **scientific background for sustainable nature management** in the Basin taking into account its **trans-boundary location**.



Basis for joint management of river basis

There are five premises to a plan to implement joint management of river basin:

- 1) good political atmosphere between countries,**
- 2) efficient legal and institutional organization to execute international agreements and plans, and**
- 3) operative response to problems,**
- 4) technical cooperation in their solution, and**
- 5) an information exchange.**

As **A.G.Isachenko** pointed out (1996, p. 13) “Any territory, in any limit, can undoubtedly be subject to environmental and geographic analysis, **but the basic principle of such analysis should be its implementation according to the landscape structure of the territory,** in other words, according to natural territorial units - ... geosystems of this or that level”.

There are many definitions of landscape among Russian geographers. N.A.Solntsev (1948) has suggested to understand landscape as a geographical landscape **genetically homogeneous territory** on which natural recurrence of the same interconnected combinations is observed : **a geological structure, forms of a relief, surface and underground waters, microclimates, soil differences, vegetation and fauna**

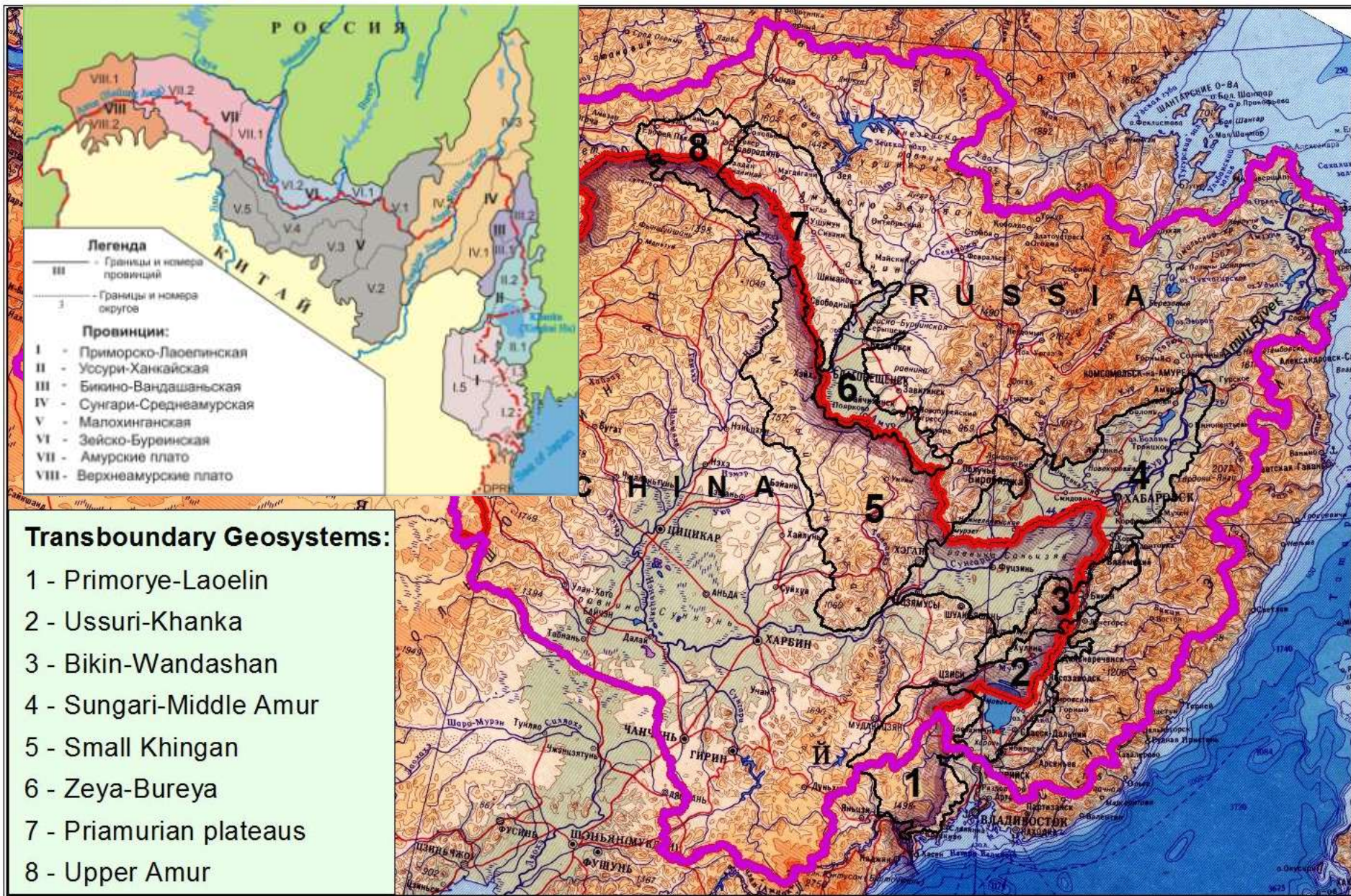
The drawing of the land use functional zoning map takes several phases.

The sequence of conducting analysis for functional zoning of a certain territory corresponds to the principle of accumulation of knowledge on its:

- **landscape organization,**
- **natural resource potential,**
- **the kinds of land use and**
- **disturbances resulting from economic activities (land use).**

The functional land use zoning map is based on data obtained from classifying geosystems of various rank, their zoning, drawing up of thematic map layers.

Trans-boundary physical-geographical provinces in the Amur River Basin

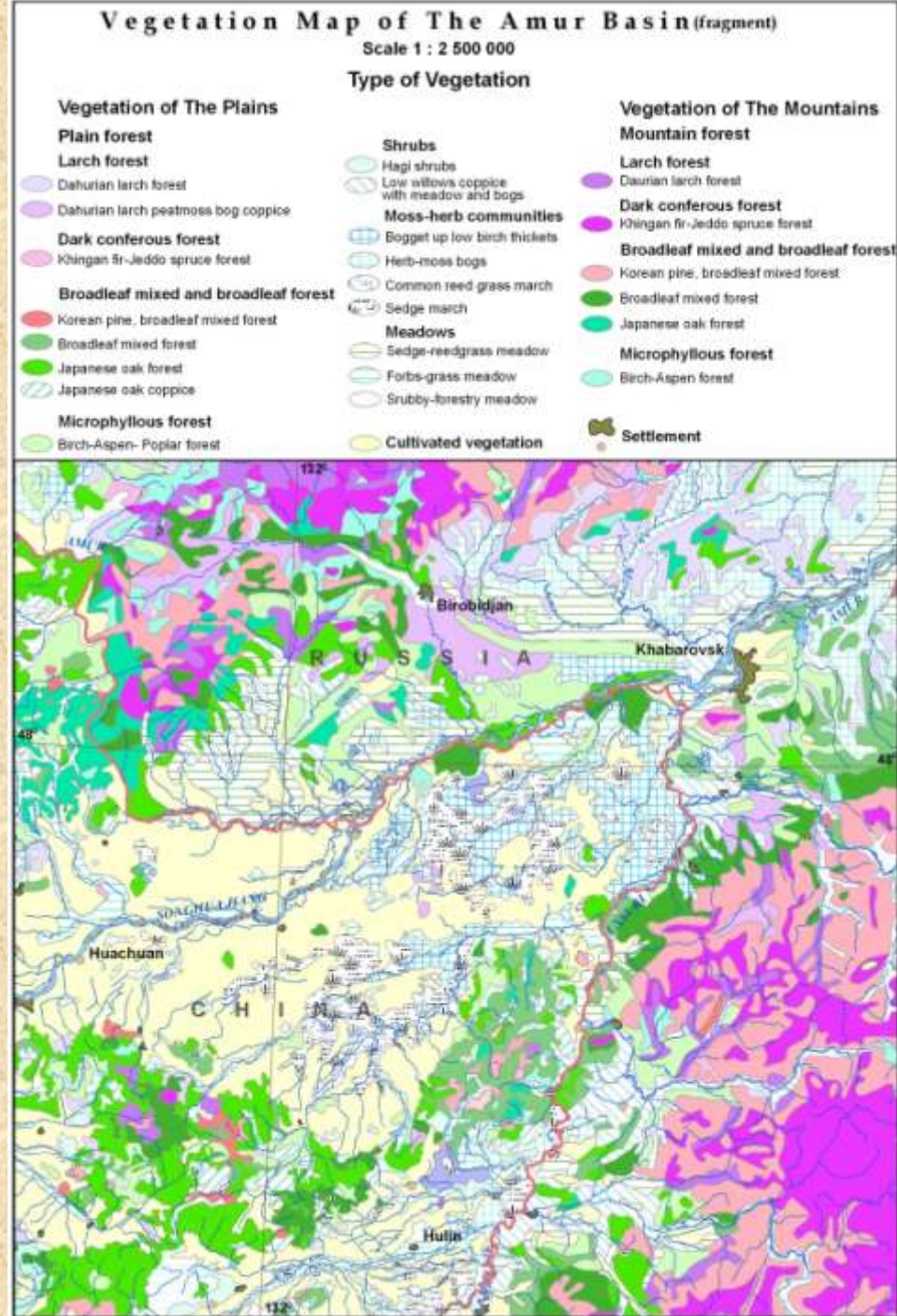
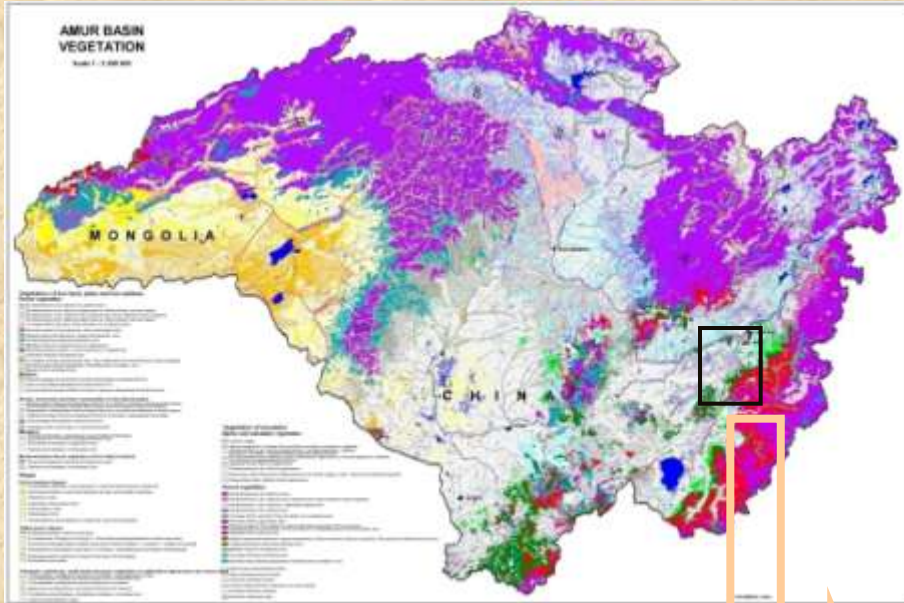


Classification (fragment) of Transboundary Geosystems of Regional and Superior Topological Levels of the South Russian Far East and North East China (Ganzev, Mishina, 2002; Ganzev, 2003; Mishina, 2003)

Dimension								
Planetary						Regional		Topological
Geosystem rank								
1	2	3	4	5	6	7	8	
Physical and geographical belt (p/g)	Group of p/g ranges	Subcontinent	P/g ranges (latitude or altitude zoning)	Natural zone	Subzone	Province	Okrug	
Northern temperate	Primorsko-Priamurskaya and Northeastern of Asia abroad	East Asia	East Manchurian range	Coniferous – deciduous forests	Southern	Primorsko-Laoyeling low-middle mountainous with coniferous-deciduous forests, oakeries, mountainous forest steppe and meadows-steppe vegetation on brown mountainous forest, meadows brown, meadows gley and peat soils	I.1. Nizhnetumanskii (Lower Tumen), I.2. Chernogorskii-Panlinskii (Black Mountains-Panling); I.3. Srednesuifenskii (Middle Suifenhe); I.4. Pogranichno-Taipinglinskii (Pogranichny-Taipingling); I.5. Laoyeling	
			Prihankaiskaya range	Forest steppe / Coniferous – deciduous forests	Stepped and meadows	Ussuri-Khankaiskaya accumulative plain of locally hilly and ouval relief with meadows and swampy, and meadows and steppe vegetation, oak woods and sparse woods on meadows and gley, meadows and malted, meadows and swampy and brown podzolic soils	II.1. Prihankaiskii; II.1. Ussuri-Mulinghe	

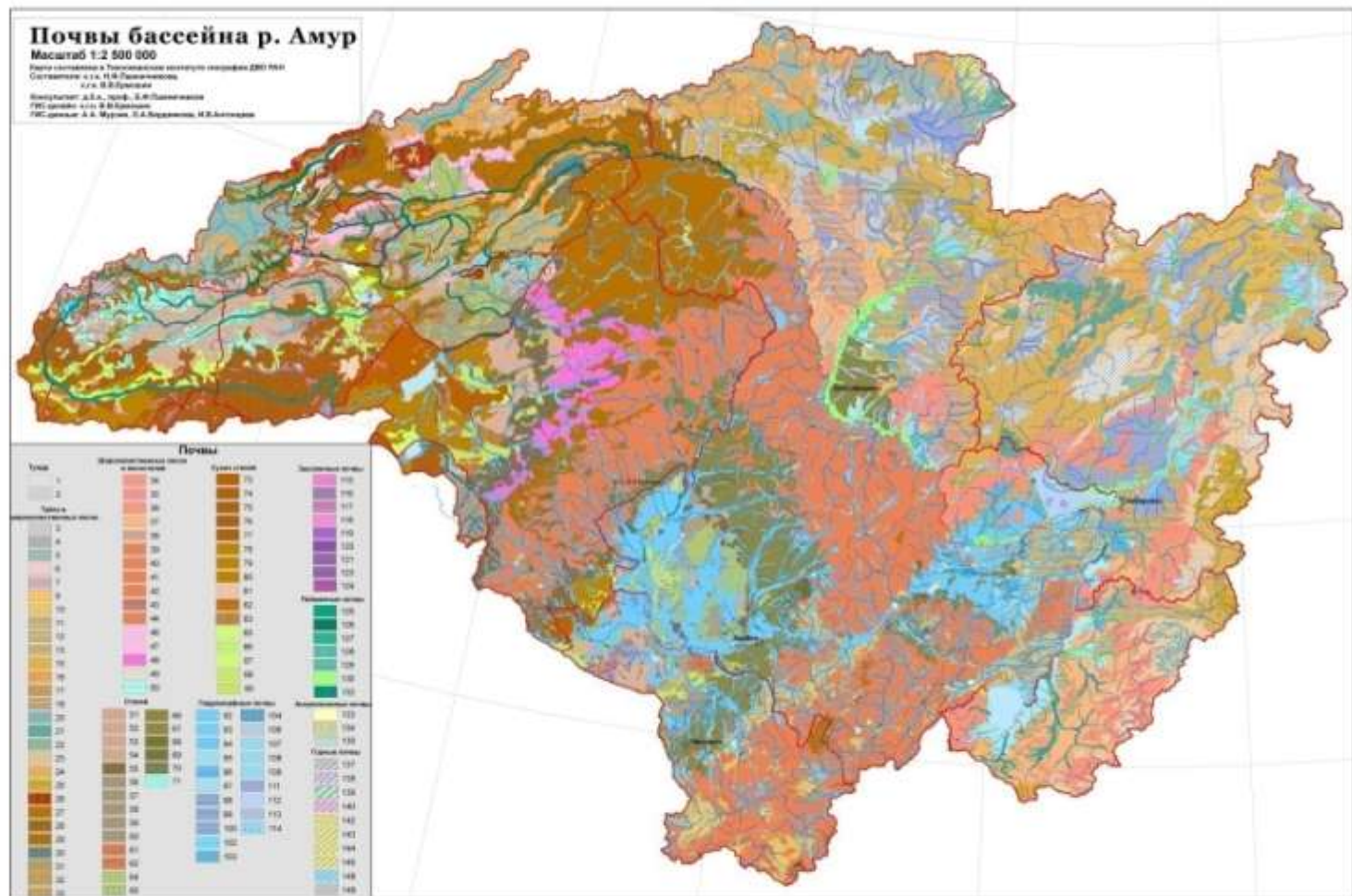
The phases of compiling of land use functional zoning map

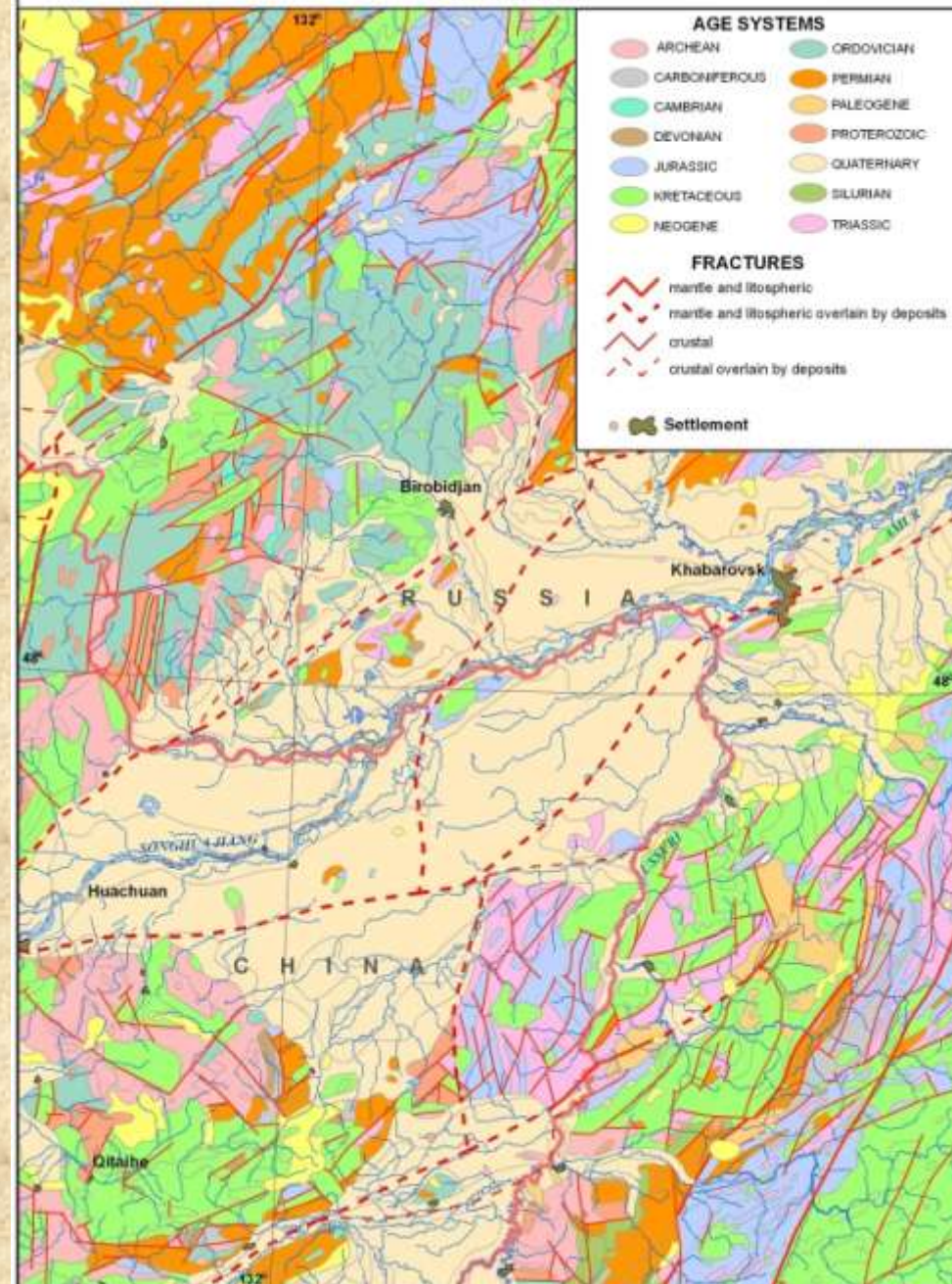
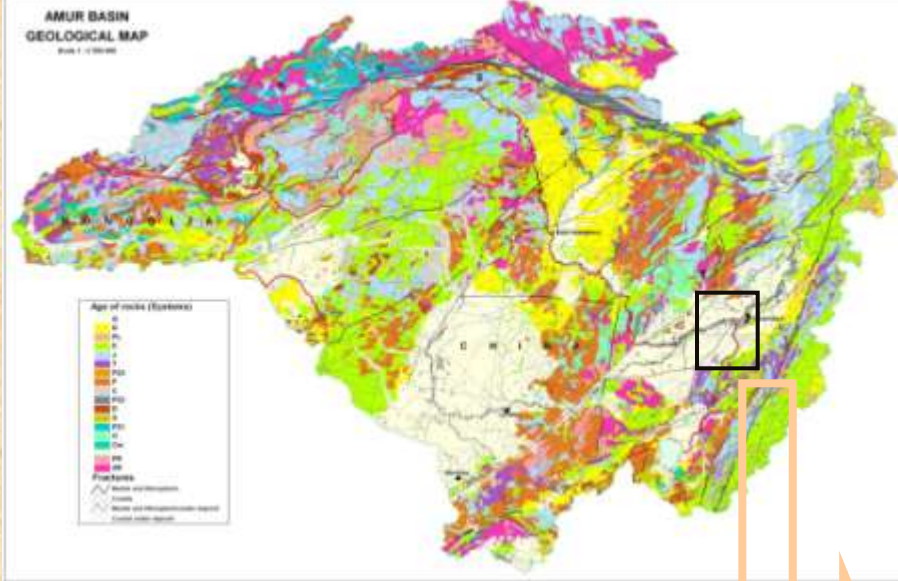
The first phase is a need to define the natural structural organization of geosystems and their operating parameters.



**Vegetation Map of the
Amur River Basin
Original Scale 1: 2 500 000**

Soil map of the Amur River Basin





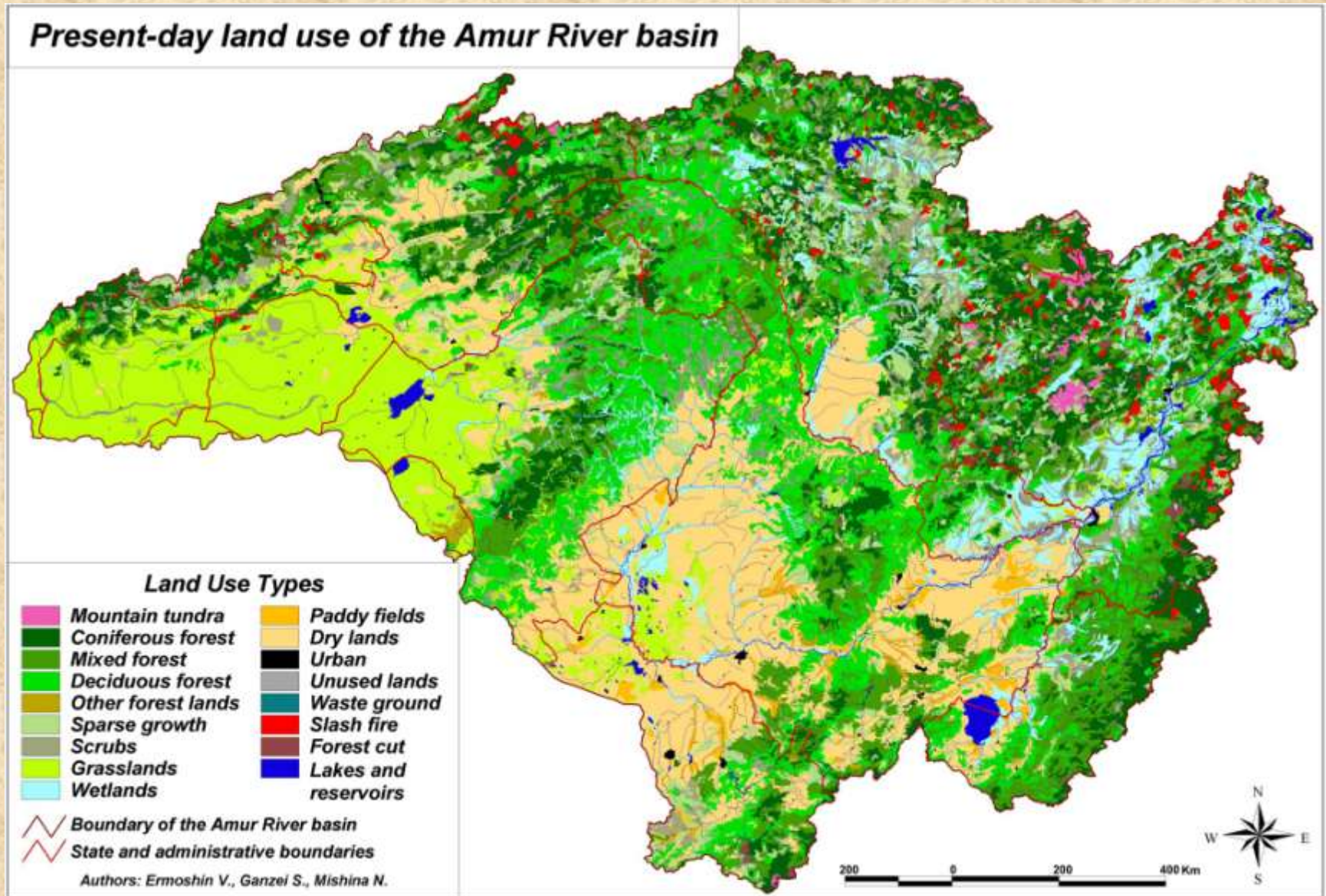
Geological Map of the
Amur River Basin
Original Scale 1: 2 500 000

The second phase of territory analysis is the assessment of its natural resource potential.

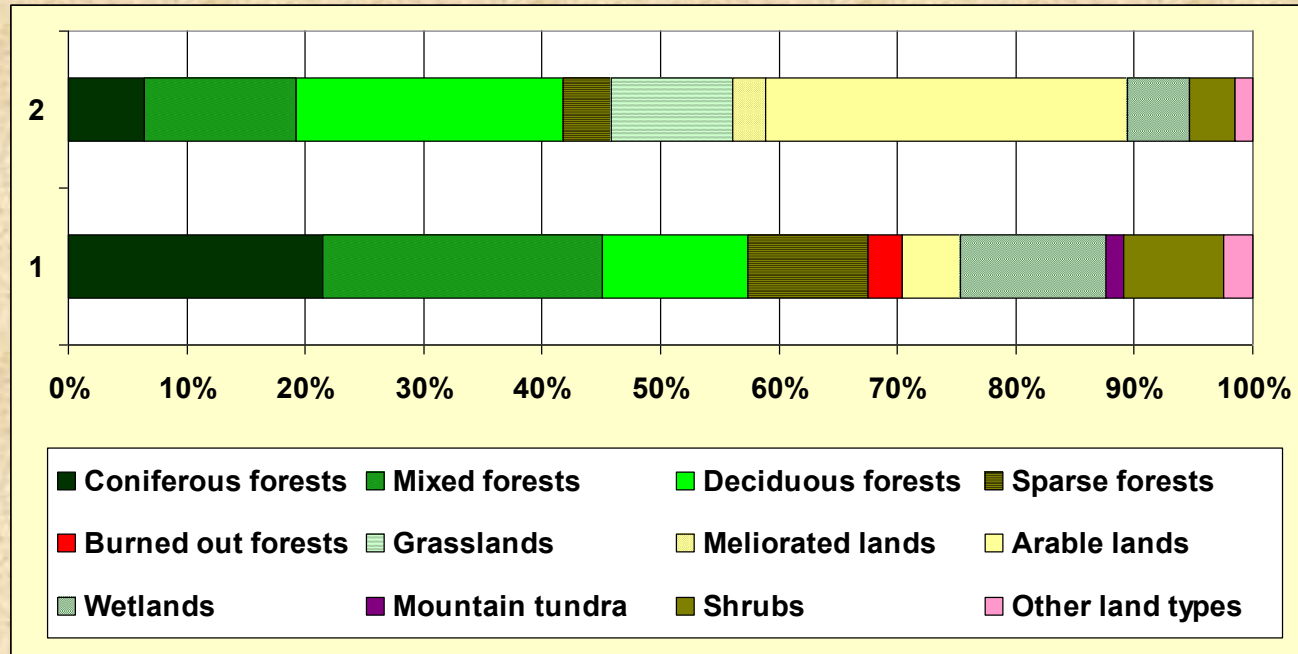


Natural-Resources combination in the trans-boundary geosystems

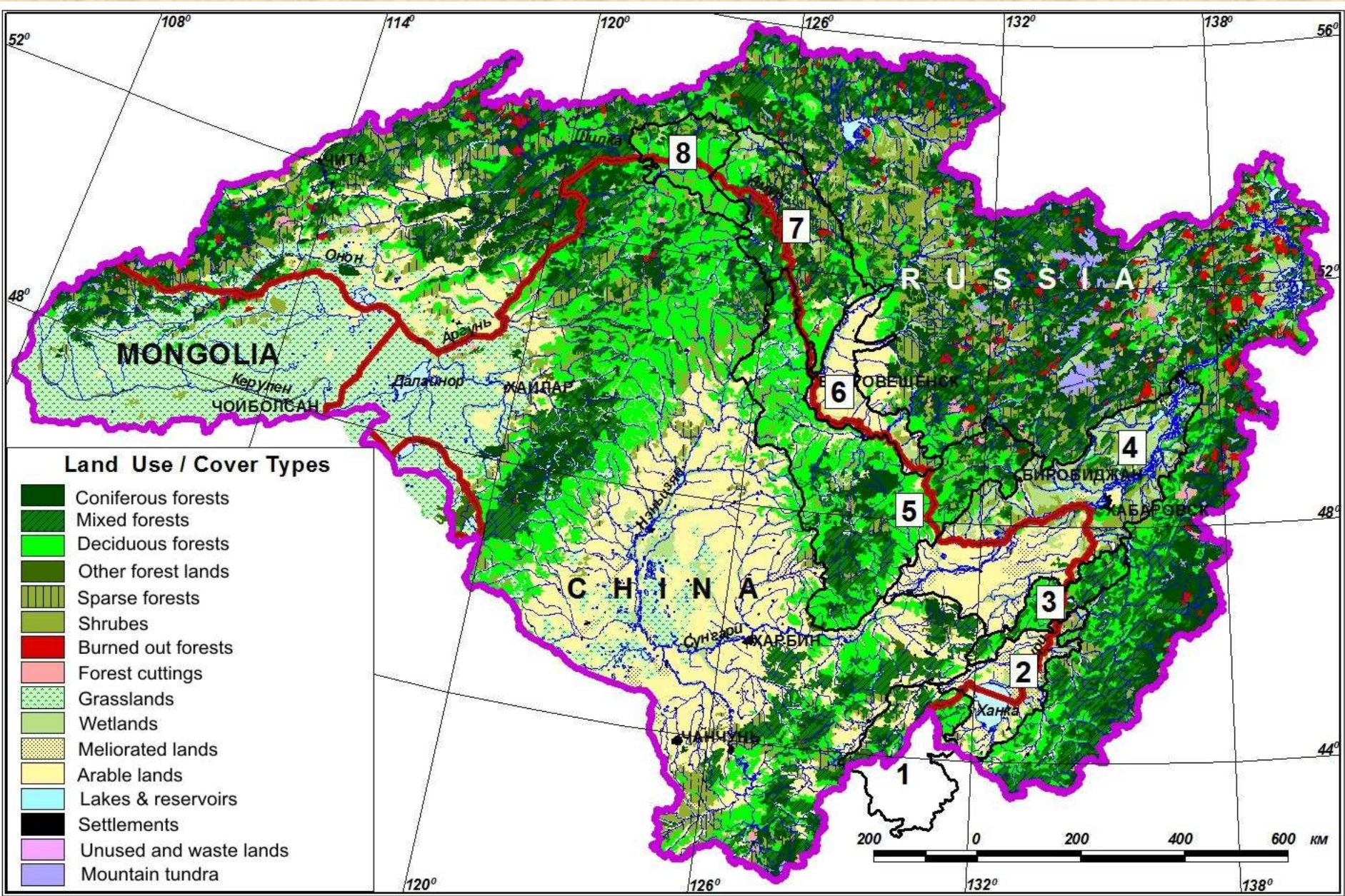
The **third phase** of a territory's study is an assessment of the current land use.

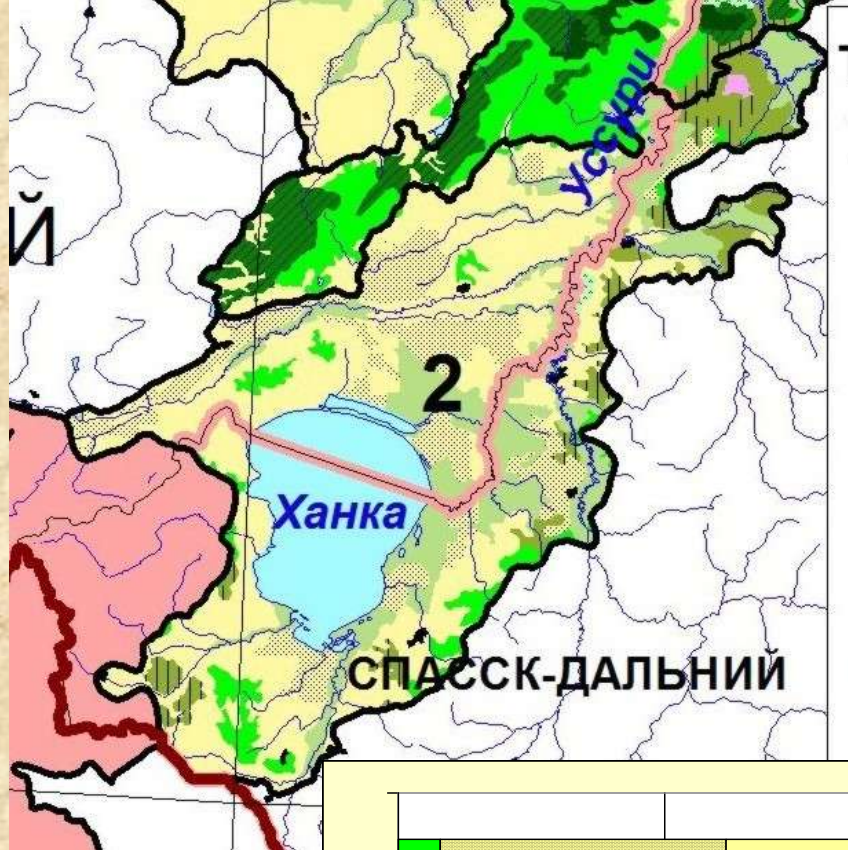


Land types of the Far Eastern (1) and Chinese (2) parts of the Amur River basin

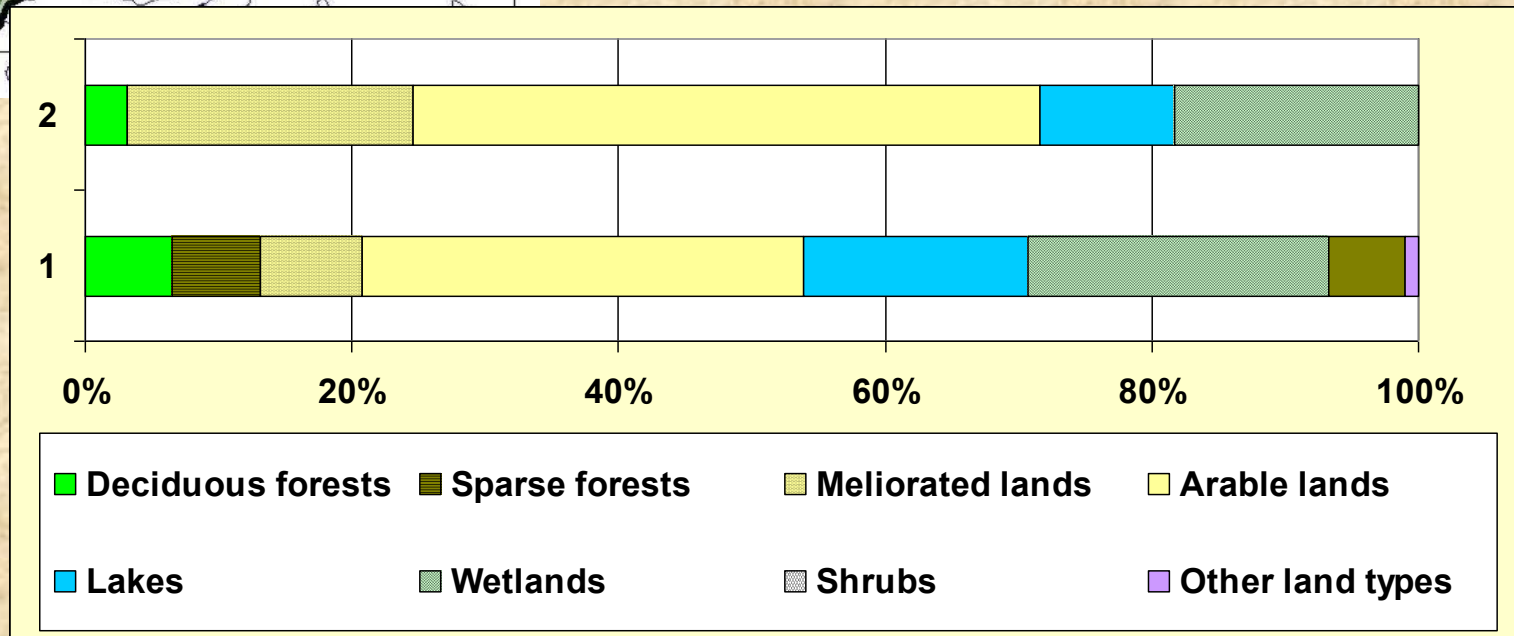


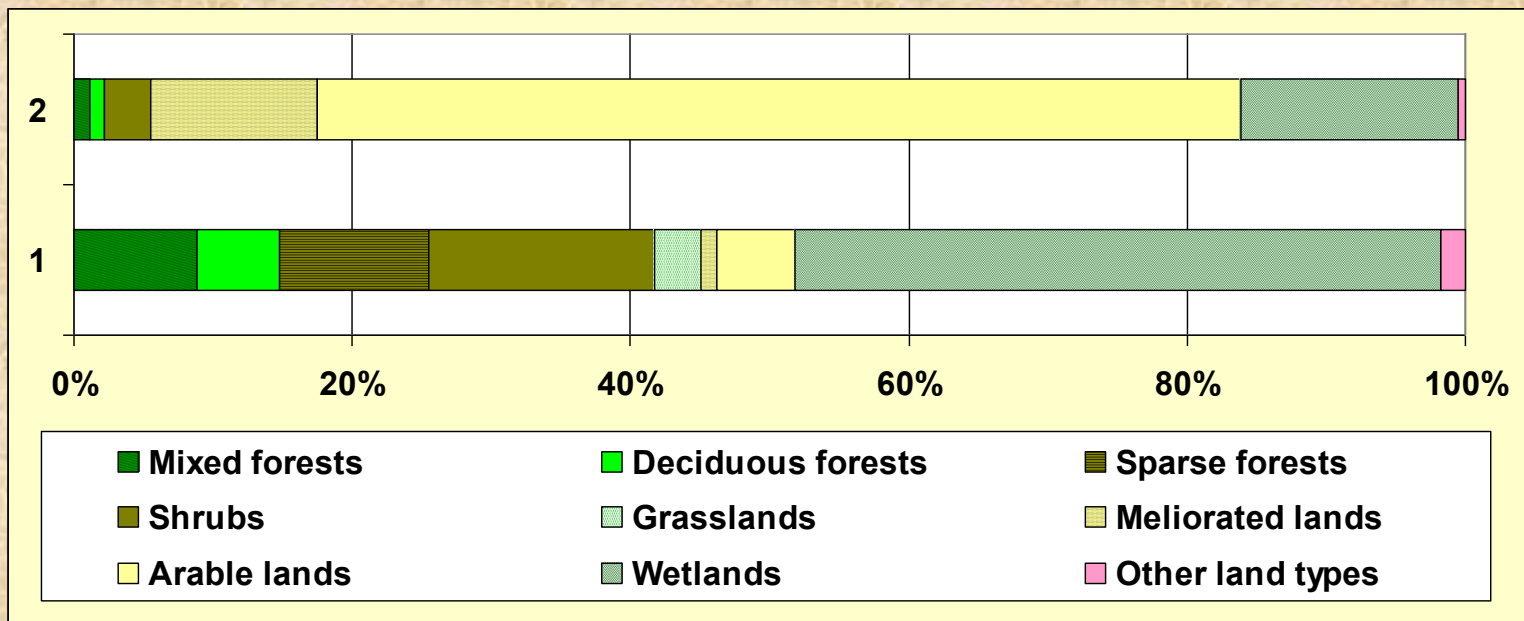
1. Along both sides of the border the composition of five primary land types, leading by number of polygons, is similar. It includes 3 forest types together with shrubs on Russian side and arable lands on the Chinese side.
2. The largest average polygon area in the Chinese part of the basin belongs to arable lands, broadleaved forests, meadows and wetlands
3. On the Russian territory the predominating lands are arable lands and wetlands together with coniferous, mixed and deciduous forests
4. correlation between average size of the polygons of various land types in the Russian and Chinese parts of the basin is more diverse. It is also revealed by comparing the dimensions of total areas of certain land types and the number of their polygons.





Land types of the Russian (1) and Chinese (2) parts of the **Ussuri-Khanka geosystem**





Land types of the Russian (1) and Chinese (2) parts of the **Sungari-Middle Amur geosystem**

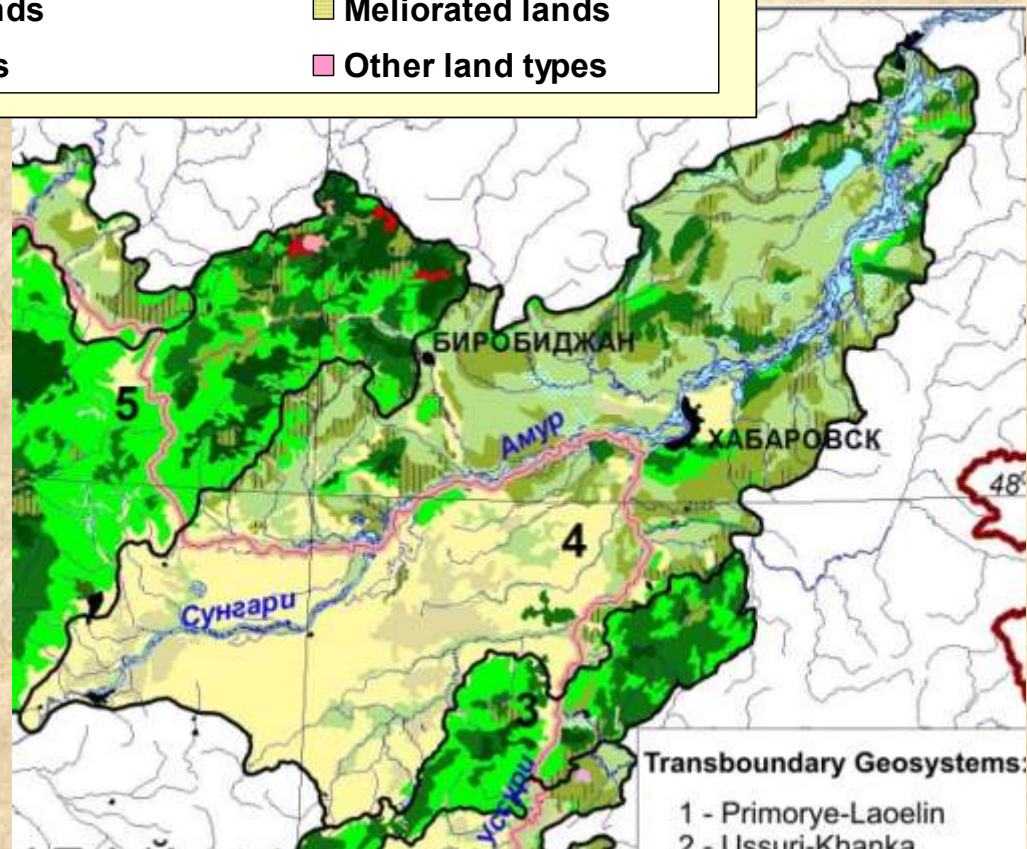
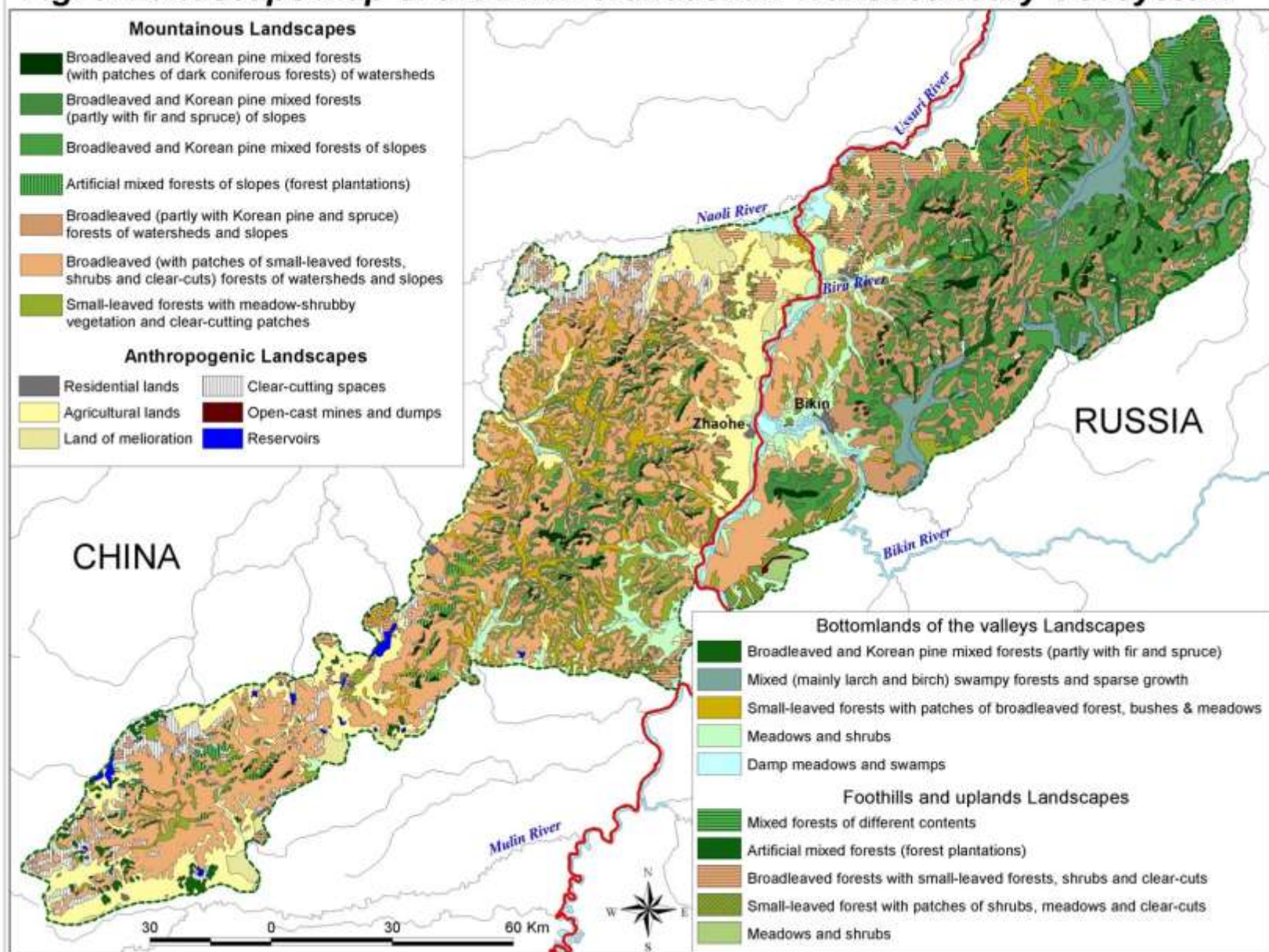





Fig. 3. Landscape map of the Bikin-Wandashan Transboundary Geosystem



Legend

-  State boundary
-  Boundary of administrative raions (RF) and counties (PRC)
-  Boundary of the Bikin-Wandashan transboundary territory

-  Coniferous forest
-  Mixed forest
-  Broadleaved forest
-  Small-leaved forest
-  Sparse growth, shrubs and meadows
-  Damp meadows and swamps
-  Arable land
-  Improvement land
-  Clear-cutting areas
-  Forest plantations
-  Settlements
-  Open-pits and dumps
-  Reservoirs
-  Railways
-  Motor roads

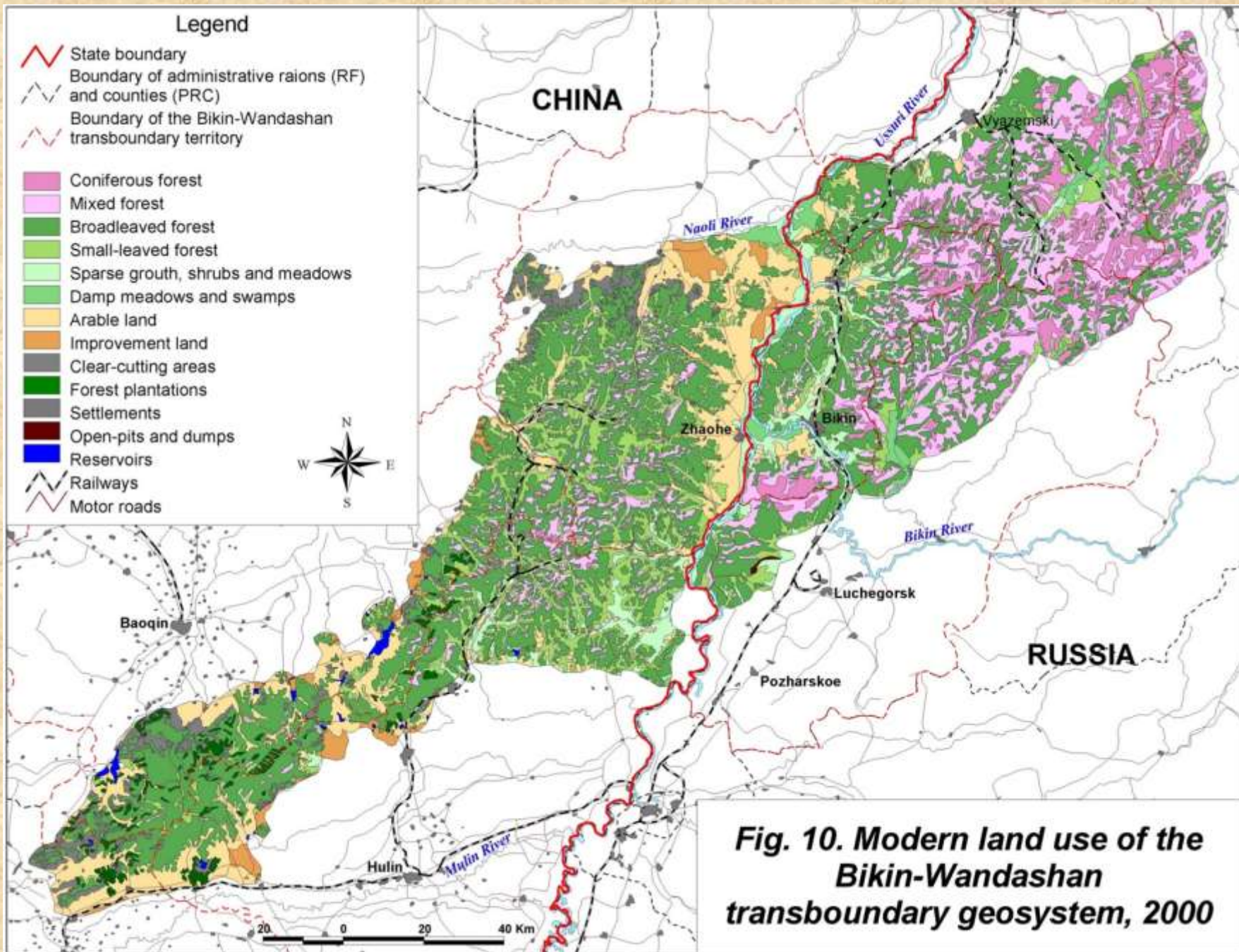
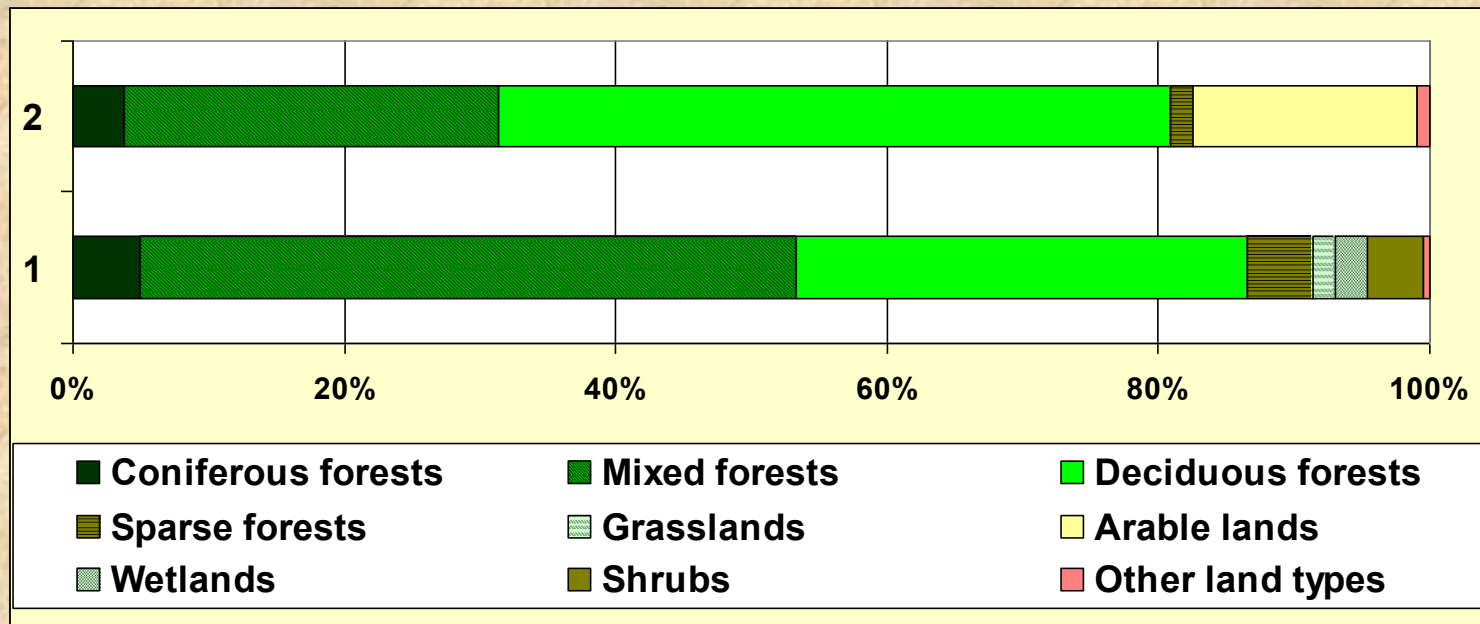


Fig. 10. Modern land use of the Bikin-Wandashan transboundary geosystem, 2000

Land types of the Russian (1) and Chinese (2) parts of the Bikin-Wandashan geosystem



The results of comparative study:

- 1. Chinese study area is characterized by simpler typological land structure on the level of separate transboundary geosystems.**
- 2. The spatial structure of the “pattern” of the lands is of more complex character on the Russian side. It is also expressed by a bigger amount of contours and their smaller sizes.**
- 3. Related complication of the spatial structure and simplification of the typological structure is considered as ecologically negative situation, as it means too much fragmentation of natural territorial complexes.**
- 4. For the Amur River basin as a whole the number of land types along both sides of the border is similar, and for the transboundary geosystems the combination of land types is wider on the Russian side due to more “patterned” contours.**

The fourth phase

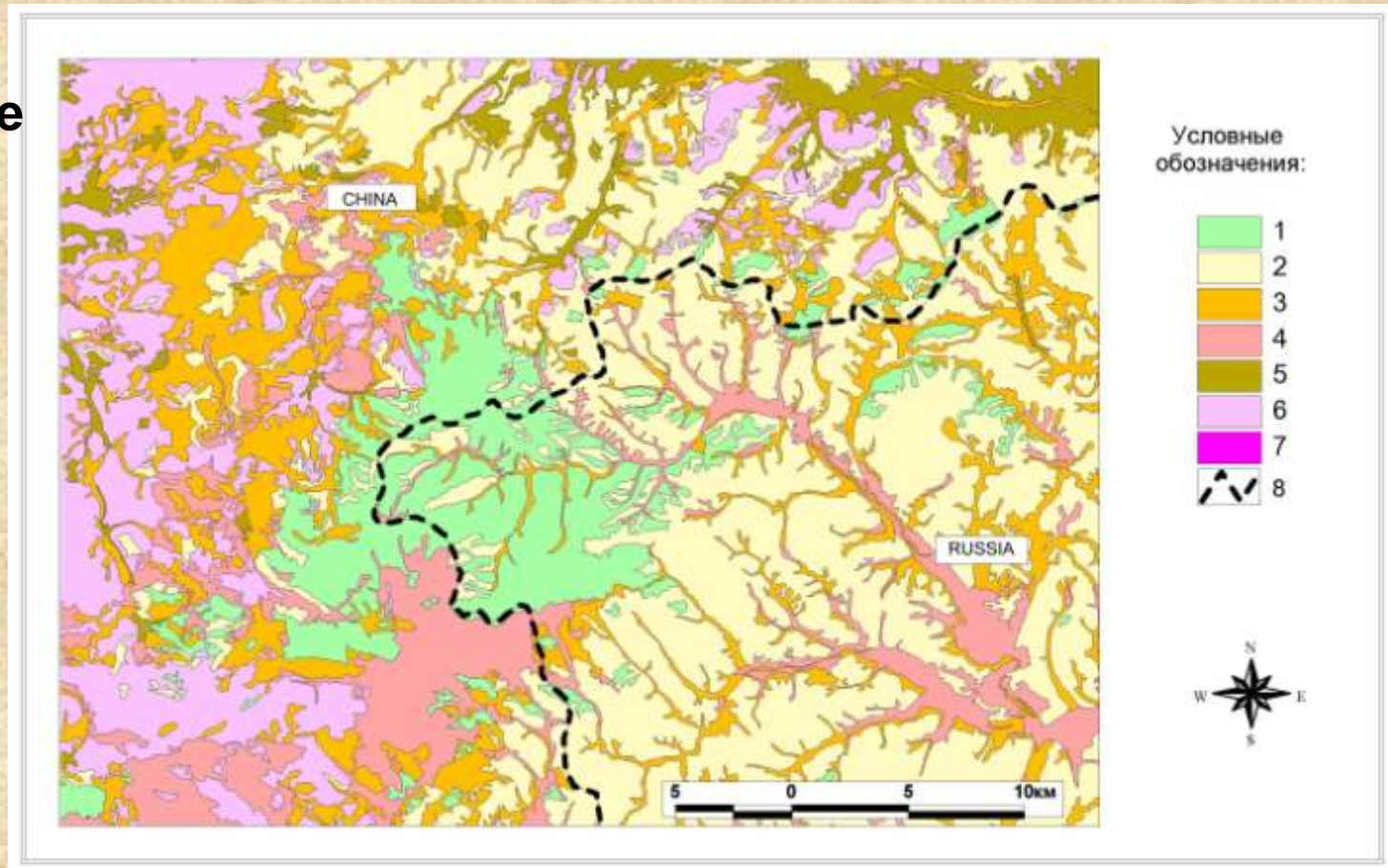


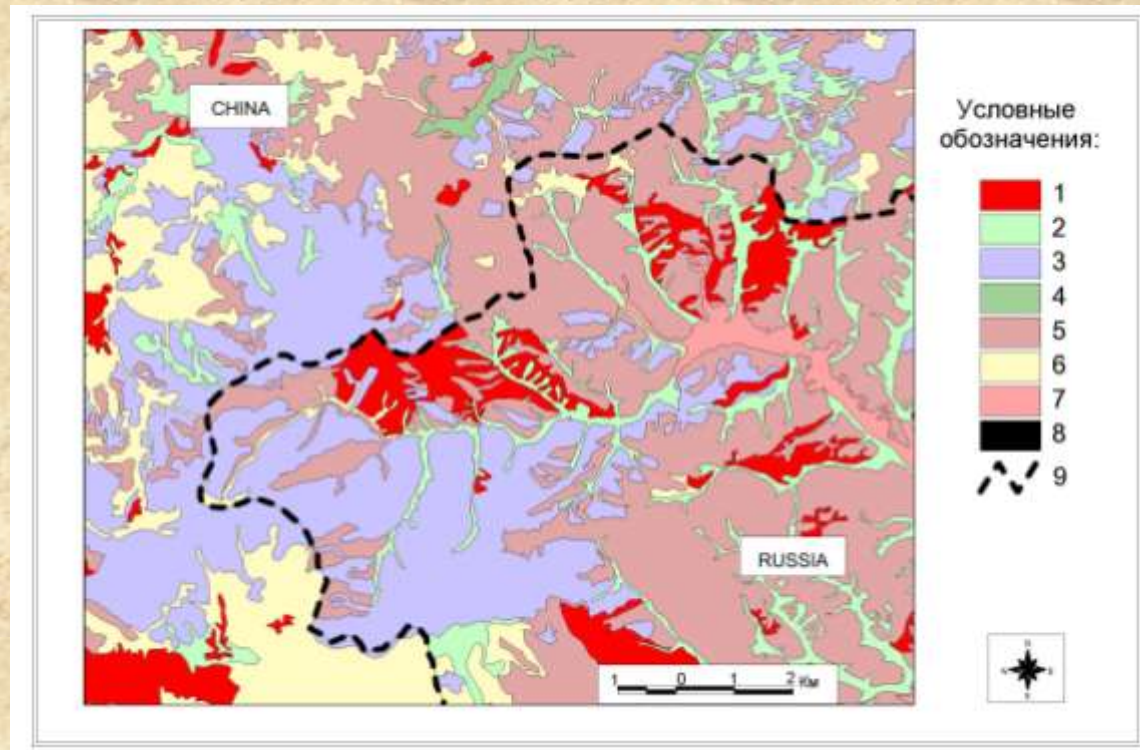
Fig. A fragment of a map of modern state of natural environment in Pogranichnyi-Laoelin geosystem

Figures on the map indicate: Disturbed geosystems:

1 - insignificantly or weakly changed geosystems; 2 - middle-weakly disturbed; 3 - considerably disturbed; 4 - heavily disturbed; 5 - completely transformed.

Restored geosystems: 6 - continuous artificial plantings;

7 - not continuous artificial plantings. 8 - Inter-state boundary.



The purposes of territorial development (fragment):

Conservation of especially valuable geosystems or transfer to this category:

Withdrawal from economic use (zones 1-4)

Preferred improvement: *Improvement with the subsequent transfer to the category of extensive use*

Conservation of existing extensive economic use or transfer to this category (zone 7)

Forms of land use of territory. Preferable use: Number of ecological zone:

1, 2, 3 - Ecological education and scientific researches, organization of monitoring wildlife. Number of ecological zone: 4 - Restoration of degraded ecosystems.

Possible use: Number of ecological zone: 1, 2, 3 - Organization of refugees for wildlife, harvesting wild products, medicinal herbs, sanitarian logging. Number of ecological zone: 4 - Reforestation, gardening. Number of ecological zone: 5, 6 - Restoration of degraded ecosystems, hunting and fishing, recreational activity.

Forbidden use: Number of ecological zone: 1, 2, 3 - a withdrawal from economic use.

CONCLUSION

The methodology of geographic maintenance of territorial development based on:

- **an application of various exploratory approaches** like geographic systemic, spatial and temporal, morphological and other relevant methods to study the structure and function of a geosystem's steady state and possible variants of their development.
- the data obtained are compiled into a functional, territorial zoning map **based on landscape's structure, types of land use, landscape disturbance** and that are used to attain the design features for **sustainable nature management** of a territory
- and that is used to provide cartographical substantiation **for the management decision** for the territory.

THANK YOU !