Development of the system of transboundary protected areas in the Asian part of Russia

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Abstract. The task of preserving biotic and landscape diversity in the conditions of separation by administrative or state borders leads to organizing transboundary protected natural areas that are important for the preservation of the natural environment and formation of the entire natural complex sites. The article presents the results of scientific analysis of the current situation concerning the creation of transboundary protected areas, as well as examples of those existing in the Asian part of Russia and promising for creating. In 2019, there are interstate agreements with Mongolia, China and Kazakhstan, providing for the activities of five transboundary protected natural areas: "Altai", "Dauria", "the Amur Sources", "Lake Khanka", and "Ubsunur Depression". Additionally, we indicate transboundary specially protected natural areas of the Asian part of Russia that are the most important for the future. Analysis of the current situation concerning the protection of nature in the border areas allows us to identify ten new territories that are well-known for high environmental importance. The well-studied and promising territories include: "Khentei-Chikoiski highlands", "the Selenga", "From Huvsugul to Lake Baikal", "Sayan Cross", "Saylyugem", "Delger-Muren", "the Amur Tiger and Leopard", "Tumangan", "South Kuril Islands", and "Beringia". Cooperation with such countries bordering with Russia as Kazakhstan, China, Mongolia, North Korea, Japan, and the United States is expected.

1. Introduction
Territorial nature protection is implemented mainly in the activities of specially protected natural areas (PA): natural reserves (zapovedniki), national and natural parks, natural refuges (zakazniki) and other PA categories. In that case, if the natural complexes that are important to preserve are a single territory divided by the border between two or more states, the challenge is designing and creating transboundary protected natural areas (TPA). Further development in Siberia and the Far East of the existing five TPA and the ability to create new such areas is associated with the analysis of some cartographic and institutional issues addressed in the article.

The Russian Federation's land and water borders in Siberia and the Far East touch the Republic of Kazakhstan, Mongolia, the People's Republic of China, the Democratic People's Republic of Korea, Japan, and the United States of America. The economy of these countries, the political regime, the pace of socio-economic development as well as their interstate relations are very different. On the other hand, the protected area systems, with some differences, are very similar and fit into the General system of PA categories adopted by the International Union for Conservation of Nature (IUCN). Notably, the greatest variety of PA categories is represented in China, a significant – in the United States (in both countries, different PA categories are subject to different agencies), the smallest – in
the Democratic People's Republic of Korea, but perhaps, this is due to incomplete information about this closed country.

The main institutional problem of the implementation of TPA in Russia is the absence in the Russian legislation of Federal laws concerning PA of international importance: the world heritage sites, key ornithological, botanical key and key soil territories, including TPA. This situation complicates the creation of new and effective management of the existing TPA.

2. Models and methods
The ability of the research system TPA appeared after the establishment of three fundamental scientific and cartographic works: Atlases of the PA for Lake Baikal, Siberian and Far Eastern federal districts [1-3]. For the preparation of these publications, «One aspect method of Atlas mapping» developed at Sochava Institute of Geography SB RAS was used, which (in contrast to the widespread approach of mapping different aspects of the same geographical object) considered one aspect (landscape structure) for multiple objects (473 protected areas of Siberia and the Far East). Thematic Atlas mapping of landscapes within the boundaries of each PA allowed assessing the necessity and sufficiency of their system in the Asian part of Russia in terms of coverage of landscape diversity.

Analysis of the TPA planning was performed from 2000 to 2019. In each case, we used the official database of the Ministries and Agencies in charge of PAs. For mapping TPA, it was important to identify differences in the description of the boundaries, their cartographic representation and institutional territorial overlap of neighboring PA.

3. Results and discussion
By 2019, five TPA have been operating in Siberia and the Far East: "Altai", "Dauria", "the Amur Sources", "Lake Khanka", and "Ubsunur Depression" [1-5]. Ten more TPA are promising to create: "The The Khentei-Chikoi highlands", "the Selenga", "From Huvsugul to Lake Baikal", "The Sayan Crossing", "Saylugem", "Delger-Muren", "the Amur Tiger and Leopard", "Tumangan", "the South Kuril Islands", and "Beringia".

The figure 1 shows the location of the Siberian and Far Eastern TPA. Moreover, the creation of the Commander-Aleutian Islands chain TPA is being discussed. This TPA includes the Komandorsky Nature Reserve, including the islands of Bering, Medny, Toporkov, Ariy Kamen (Kamchatka region, 1993, 3 648 679 ha, including water area of 3 463 300 ha) and the westernmost Aleutian islands: Attu, Agattu and a group of the Semichi islands (Alaid, Nizkiy, Simiya, Hammerhead, and Lotus) with water areas (USA, Alaska) where there are no functioning protected areas yet.

Figure 1. Location of the Siberian and Far Eastern TPA. TPA: I. - Existing: 1 – Altai, 2 – Ubsunur Depression, 3 – the Amur Sources, 4 – Dauria, 5 – Lake Khanka; II. – Planned: 6 – Saylugem, 7 – Delger-Muren, 8 – Sayan Crossing, 9 – From Lake Huvsugul to Lake Baikal, 10 – the Selenga, 11 – Khentey-Chikoi Highlands, 12 – the Amur Tiger and Leopard, 13 – Tumangan, 14 – the South Kuril Islands, 15 – Beringia.
Table 1 shows brief information about these TPA in the order of their creation. Table 2 provides information on promising TPA to create.

**Table 1. Existing Siberian and Far Eastern TPA**

| Name               | Country       | Area, ha | Description | Reference |
|--------------------|---------------|----------|-------------|-----------|
| Dauria, 1994       | Russia, Mongolia, China | 740 000 | reserve “Daursky” (1986) | [1, 6-8] |
|                    | 57 900        | refuges “Tsasuchëysky Bor” (1981) |             |
|                    | 213 838       | refuges “Dolina Dzerena” (2011) |             |
|                    | 108 154       | reserve “Mongol Daguur” (1992) |             |
|                    | 740 000       | reserve “Dalaynor” (1986) |             |
| Lake Khanka, 1996  | Russia        | 32 289   | reserve “Khankaysky” (1990) | [8] |
|                    | China         | 222 488  | reserve “Sinkay-Khu” (1986) |             |
| Ubsunur Depression, 2011 | Mongolia | 323 198 | reserve “Ubsunur Depression” (1993) | [7] |
| Altai, 2011        | Russia, Kazakhstan, Mongolia, China | 254 204 | natural park “Zona pokoya Ukok” | [2, 7-10] |
|                    | 131 270       | natural park “Belukha” (1997) |             |
|                    | 643 477       | national park “Katon-Kargay” (2001) |             |
|                    | 656 088       | national park “Altan Tavan Bogd” (1996) |             |
|                    | 457 000       | refuges “Khanas” (1986) |             |
| the Amur Sources, 2014 | Russia, Mongolia | 210 988 | reserve “Sokhondinsky” (1973) | [5] |
|                    | 5 273         | refuges “Gornaya Step” (2003) |             |
|                    | 397 379       | national park “Onon Baldzh” (2000) |             |

4. Conclusion

Of the existing TPA, one is incompletely created. During the initial design of TPA "Altai", an agreement between Russia, China, Mongolia and Kazakhstan was planned [9]. Probably, the agreement between Kazakhstan and Russia became the first step in creating a four-sided TPA. The planned TPA «The Sayan Crossing» implies the inclusion of territories of traditional nature use, which are divided into the state and administrative boundaries of the four indigenous peoples: the Dukha (Mongolia), Todzhu, Tofa, and Soyots (Russia). The creation of TPA "the South Kuril Islands" may solve the problem of the disputed Kuril Islands between Russia and Japan.

The border territory can be identified as some area with a real or potential impact of neighboring states. In the administrative territories facing the state border, various organizations for cross-border cooperation, including projects in the field of territorial nature protection, appear in the management structure. They are based on the same composition of natural systems (landscapes and ecosystems), similar institutions developed, joint or similar public management or social structures. Special intergovernmental agreements and mixed international commissions should play an important role in the management of such a system. To achieve sustainable environmental management and development of these territories, it is necessary to elaborate joint international programs, scientific research, special cartographic works for certain territories and waters. The main need for the establishment and functioning of TPA on the Russian side is to adopt a special Federal law on transboundary protected natural territories of international importance.

Transboundary protected natural areas are protected natural areas located on both sides of an interstate border that have a common or similar legal basis and are managed under a single plan in under an interstate agreement. Cross-border protected areas contribute to the preservation of biotic and landscape diversity, solve the problem of separation of natural areas with the common composition, which is especially important for large-areal and migratory animals.
Table 2. Promising Siberian and Far Eastern TPA to create.

| Name                        | Country     | Area, ha | Description                                | Reference |
|-----------------------------|-------------|----------|--------------------------------------------|-----------|
| Khentey-Chikoi Highlands    | Russia      | 664 468  | national park "Chikoy" (2014)              | [3, 4, 7, 8, 11] |
| Selenga                     | Russia      | 42 180  | refuges "Borgoysky" (1979)                 | [1, 3, 4, 7, 12] |
| From Lake                   | Russia      | 1 183 662 | refuges "Snezhinisky" (1976)               | [1, 12] |
| Huvsugul to Lake Baikal     | Mongolia    | 238 480  | refuges "Snejatinisky" (1976)              | [1, 12] |
| Sayan Crossing              | Russia      | 300 398  | refuges "Azas" (1985)                      | [1, 7, 13]|
| Saylugem                    | Russia      | 118 380  | refuges "Shavlinsky" (1981)                | [1, 7] |
| Delger-Muren                | Mongolia    | 147 875  | refuges "Ikh-Tayrising" (project.)         | [4, 7] |
| Amur Tiger and Leopard      | Russia      | 18 045  | refuges "Kedrovaia pad" (1924)             | [8, 9] |
| Tumangan                    | Russia      | 52 778  | refuges "Khasansky" (1997)                 | [2, 8] |
| South Kuril Islands         | Russia      | 65 365  | refuges "Kuriisky" (1984)                  | [2, 14, 15]|
| Japan                       | Japan       | 226 764  | national park "Daysecurus" (1934)          | [16] |
| Beringia                    | Russia      | 1 819 454 | national park "Beringiya" (2013)           | [16] |
|                           | USA          | 1 091 595 | national park "Bering Land Bridge" (1978)  | [2, 14, 15]|
|                           |             | 2 658 746  | reserve "Noatak" (1980)                    | [16] |
|                           |             | 3 328 700  | national park "Kobuk Valley" (1980)        | [16] |
|                           |             | 3 428 700  | national park "Gates of the Arctic" (1980) | [16] |

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