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PROBLEMS AND PROSPECTS OF INTERSTATE GEOINFORMATION INTERACTION IN THE ZONE OF THE SILK ROAD

ABSTRACT

The article presents the results of the implementation of the Russian-Mongolian project “Creation of the Baikal Information Center (BIC)”. For the first time on the territory of the Great Silk Road, an intergovernmental information structure has been organized for collection, processing and analyze environmental information in order to inform the world community about the state and territorial development of Lake Baikal and its water basin. The main problems of the Russian-Mongolian information interaction are identified, the principles of successful interstate information neighborhood are formulated, which represent the totality of organizational, technological, environmental and normative-methodical measures. Methodical bases of creation of the international information-telecommunication system providing operative access of representatives of the ministries and departments, business, the population to actual and reliable information on the state of the watershed of Lake Baikal are developed. A technological basis of the BIC, including a geographic information system and an international geoportal, is described. The structure of the geoportal is presented, the headings and content of the contained materials are described. The technique of creation of cartographic service on the basis of the open spatial platform and its introduction into the geoportal is developed. An example of a map on the geoportal and printed products of the BIC is presented.

KEYWORDS: Russian-Mongolian transboundary basin of Lake Baikal, interstate geoinformation interaction, Baikal information center, geoportal

INTRODUCTION

A common characteristic of the modern territorial governance is the computerization of the economical activities and information of socio-natural processes. The exchange of information and other types of information activity of border economic entities are the basis for successful economic and environmental inter-state cooperation in the zone of the Silk Road. In particular this applies to the transboundary geosystems separated by state borders. Such geosystem is Lake Baikal basin, which contains the territories of four subjects of the Russian Federation and a large part of Mongolia and where going similar nature processes [Borisova, 2013; Kuimova, Sherstyankin, 2008; Obyazov, 2010; Gunin et al., 2008]. The process of information sharing of the border areas of neighboring countries is characterized by technological and organizational features, but in general is determined by implementation of the general technical innovation. At the same time,

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economic and social relations are largely associated with nature management, and its border problems are similar in nature [State report..., 2017; Report..., 2015; Strengthening...¹; Mongolian...²].

Known successful experience of the application of geographic information systems in the organization of the Russian-Polish interstate network of cooperation in the area of the Vistula Lagoon [Gricenko et al., 2013], the method of assessment of recreational resources of transboundary Gorny Altai, based on GIS technology [Garms at al., 2013], formulated the principles of creation of information system of interstate exchange of data management transboundary water body [Skachedub et al., 2007]. In addition, work is underway on the organization of a system of international, regional and national standardization and the adoption of common indicators to evaluate the information of cross-border areas [Golovin, 2011]. For the aggregation of spatial data visualization and territorial problems the best solution is to create a map service that provides replication and publication of the results [Yakubailik, 2013; Kadochnikov, 2015].

In contrast to the densely populated and infrastructurally cultivated regions of the world, the formation of the Russian-Mongolian information space is made in slow pace. The organizational efforts of the state and science do not receive effective practical implementation, due to a number of existing problems:

- heterogeneity of the used indicators, and the formats in the formalization of the described phenomena and processes;
- absence of a unified topographic and geodetic and cartographic basis;
- information resources and telecommunication systems are placed extremely uneven on the cross-border area;
- access and exchange of information via telecommunication channels is limited by its departmental and branch affiliation;
- the high cost of the organization of telecommunication systems;
- different quality of the information;
- the problem of information security;
- the problem of the technology implementation (the barriers between researches and industry of information).

Thus, the main task of the organization of effective management of cross-border area is the creation of an international information and telecommunications system that provides quick access of the management and planning authorities in Russia and Mongolia to actual and reliable geo-information resources for coordinated regional solutions.

MATERIALS AND METHODS

This task was carried out by the collective efforts of the international staff of the Baikal Institute of Nature Management SB RAS and Water Committee of the Government of Mongolia in the framework of UNDP-GEF project “Integrated Natural Resources Management of transboundary ecosystems of the Baikal Basin”. At the organizational stage the teams of highly qualified specialists of the two countries were formed, the concept of cross-border co-operation of the information was developed, a roadmap of the project was created, a series of workshops and seminars in the cities of Ulan-Ude and Ulan Bator, and a Skype-conference were held. The result of the joint work was the creation of the Baikal Information Center (BIC) – set of information resources and technologies for the collection, processing and dissemination of the environmental

¹ Strengthening Integrated Water Resource Management in Mongolia project. Integrated Water Management Assessment Report, MEGD. UB city, 2012. V. III

² Mongolian Law on Soil Protection and Desertification Prevention, 2012.05.17. Web resource: <http://www.legalinfo.mn/law/details/8664?lawid=8664> (accessed 09.02.2018)

data of the cross-border of Lake Baikal basin based on the integration of information flows of a single information space of Russia and Mongolia [Beshentsev, Palitsyna, 2014].

The main technological module of the BIC is the international geo-portal, which functions on the open source content management system technology Plone (<http://bic.iwlearn.org>) and provides telecommunication access to cross-border management of the GIS area (fig. 1).



Fig. 1. The main page of the geoportal

While designing of the thematic structure of the geoportal, the analysis of the state and departmental statistics of Russia and Mongolia was conducted and a list of recorded information and indicators of collected arrays was defined, and the structure of a single data bank on the state of the environment in the Baikal lake basin was designed.

The geo-portal content is structured according to the categories and is presented in Russian, Mongolian and English languages. The category “Documents” contains the state reports the environmental theme, complete reports of individual studies, monographs, materials, events, research papers. The category “Monitoring” contains materials on water quality monitoring in rivers and transport model of pollutant substances and water balance in the basin. The category “Friends of the Baikal lake basin” contains information about the public ecological organizations of the two

countries. The category “Forum” provides communication of the users interested in environmental and conservation issues.

The category “GIS” contains geographic information resources of the BIC, as well as the reference spatial data and the materials on the history of ecological zoning of the basin. Through this category there is the access to the mapping service, which is organized in an open management and a publication of Geonode geospatial data. A significant part of the cartographic content is Environmental Atlas of the Baikal Lake basin [Ecological..., 2015; Batuev et al., 2015], containing 142 maps of the territory on the natural, social and environmental themes (fig. 2).

For each map a separate folder is created, such as “040. Landscapes”, where the map in png format and explanatory text in Russian, Mongolian and English versions are placed. The atlas navigation is made by blocks using the drop-down list of names, as well as through a search on the map name.

Moreover, for each map there is a link to a digital version on the cartographic service (<http://geonode.iwlearn.org>, “baikalgis” profile). It is a set of vector layers (shp) and attribute tables (dbf). The service has a functional interface that allows users with little experience to use quickly and easily the data to create and publish their own maps (fig. 3).

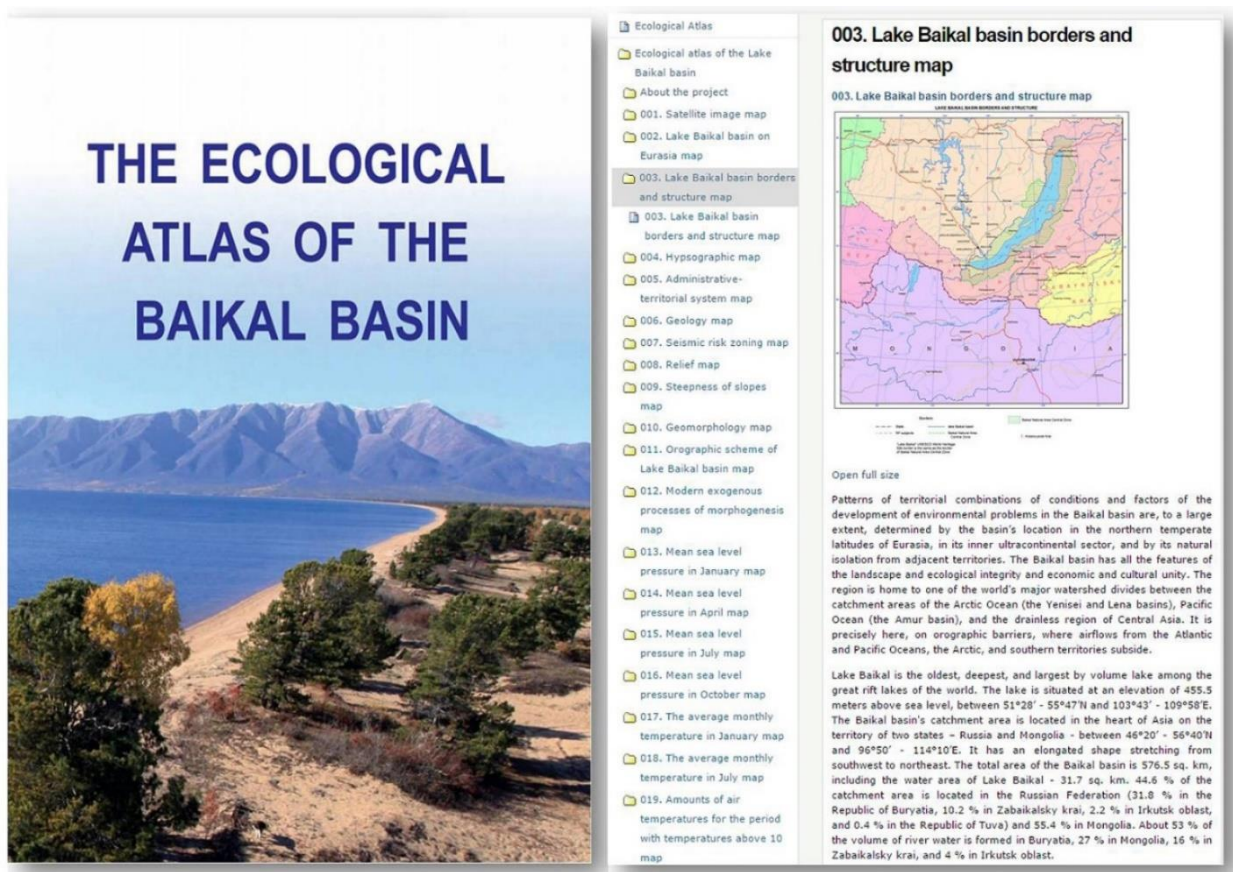


Fig. 2. Cover and interface of Ecological atlas

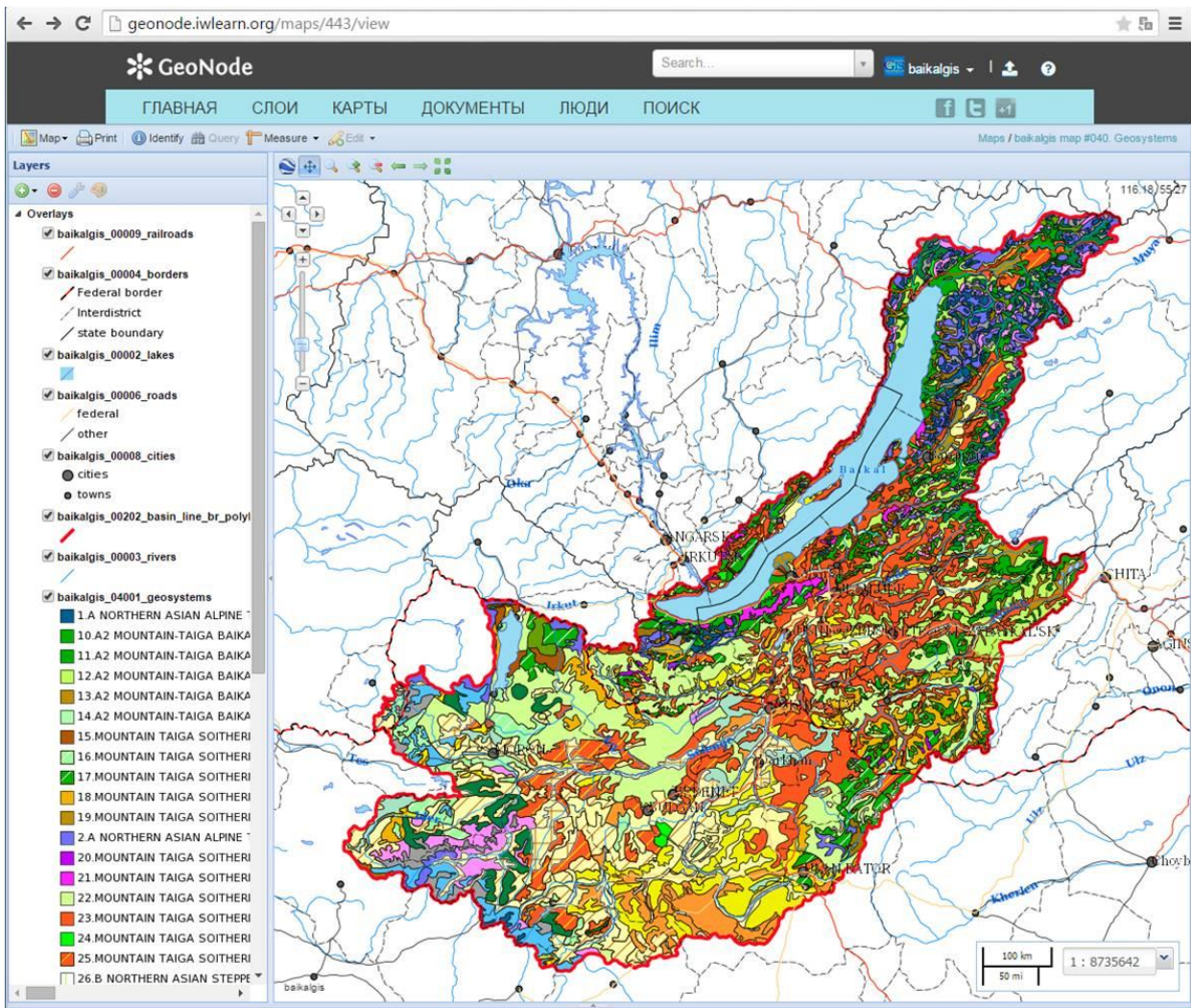


Fig. 3. An example of the vector map publication on the cartographic service of the geoportal

The BIC geoportal has a social orientation and provides free information sharing to all the segments of the population with socio-economic and environmental issues data. It publishes legislation and departmental documents, the results of scientific and applied research, as well as it provides an open platform for communication and exchange of information of all persons interested in sustainable social-economic development of the Baikal region. The products of the BIC are high-tech developments of science, business, government and the public to be placed on the Geoportal in the form of information products in Russian, English and Mongolian languages: publications, monographs, maps, original software development, the results of research projects, events, materials, official documentation. The BIC staffs prepare the quarterly information and analytical reviews to ensure a comprehensive understanding of the activities of state and regional authorities, economic and environmental decision-making at the interstate and municipal levels (fig. 4). The news block of the geo-portal publishes news in real time about events and activities in the region both of the Russian subjects and the Mongolian part of the Baikal Lake basin territories.



Fig. 4. The products of BIC

RESULTS OF RESEARCH AND DISCUSSION

Creation and development of BIC will contribute to the strengthening of a single information space of cross-border territories in the Great Silk Road region and attaining the required level of informational potential of the region through establishing mutually adjusted geo-information resources and elaboration of the shared infrastructure of spatial data. In order to implement these «information-based neighborhood» policies, it is necessary to observe the following major principles.

1. Organizational principles include the following activities and measures:

- setting up the Interstate Council for the coordination of activities between the bodies of territorial management, businesses, research institutions aiming at maintaining sustainable GIS of the transboundary territory;
- establishment and development of the single Databank on natural and social-economic information, providing for the grounded decision-making on the problem issues of transboundary relationships;
- software and technical support of agricultural enterprises and land-users;
- providing differential access to the information resources to different groups of users according to their needs and competencies;

– elaboration of GIS on the basis of the assessment of the social and economic effect of technological innovations and initiatives.

2. Technological principles include the following activities and measures:

– establishment of inter-state telecommunication nodes and routes on the basis of shared software and technological equipment;

– maintaining conceptual unity of the databases and the formats of information resources;

– unification of the existing telecommunication nodes according to their information contents, technological capacity, program software;

– integration with analogous international systems;

– use of topographic material of the single scale set, common ellipsoid parameters and cartographic projections;

– formalization of all geo-information resources on condition of maintaining accuracy, fullness and timeliness of information.

3. Environmental principles include the following activities and measures:

– registration of objects and processes of nature management on the basis of the ecosystem approach and single classification of natural landscapes;

– identification of spatial-temporal linkages, regularities and synergetic effects of transboundary nature management;

– providing a continual spatial and substantial assessment for the transformation of natural landscapes and identifying the areals of the negative impact and ecological pressures;

– identification of the optimal social-economic capacity of landscapes;

– ecological and environmental cartography.

4. Normative-methodic principles include the following activities and measures:

– filling and updating data and information exchange on the basis of the unified methodic and normative principles and standards;

– ascertaining the rights and duties of the proprietors of information resources (upholding responsibility for the accuracy, fullness and timeliness of the provided data);

– upholding the single principles of data protection on the basis of the shared legal framework.

CONCLUSIONS

For the first time in the territory of the transboundary Baikal region an information-telecommunication system is created, which provides the global community access to information on the socio-economic state of Lake Baikal and its basin. It provides an opportunity to exchange information for the public, representatives of ministries and agencies, business and non-profit organizations in the online mode. In addition, the organization of BIC promotes a unified information space on the cross-border area, allowing the two countries management and planning authorities to carry out a common economic, social, legal and environmental policies for sustainable development of the region.

The novelty of the technological solutions of the system is the integration of hypertext database, enterprise GIS and mapping services on the open geospatial platform. Creation and implementation of a modern system is the first step in the formation of the Russian-Mongolian spatial data infrastructure. Created mapping service can be used in various fields of activity of the territorial activities and first of all, is the basis of the metric monitoring of natural resources of Lake Baikal. It provides free, online access to maps and provides leaders at all levels with the necessary qualitative and quantitative indicators, algorithms of their processing and analysis, in order to make informed management decisions on the cross-border area.

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