Siberian branch RAS

For the 20th anniversary BINM SB RAS

Establishment *of the* Russian Academy *of* Sciences BAIKAL institute *of* nature management

Ulan-Ude *2011*

STRUCTURE OF BINM SB RAS

Total amount — 134 employees, 36 post-graduate students
including:
- research workers — 72
- Corresponding member of RAS — 1
- Doctors of Sciences — 15
- Candidates of Sciences — 53
- Engineers — 43

Laboratories:
- geo-ecology;
- economics of nature management;
- regional economic systems;
- oxide systems;
- engineering ecology;
- chemistry of polymers;
- chemistry of natural systems;
- chemistry and technology of natural raw material;
- analytical centre;
- international eco-educational centre “Istomino”

CENTRE OF COLLECTIVE USE OF ANALYTICAL INSTRUMENTS

The dissertation board DM 212.022.06 on specialties 25.00.24 — economical, social, political and recreational geography and 25.00.36 — geoecology.

Under the Institute operate the Buryat branch of the Russian geographical society, the Buryat branch of D.I. Mendeleyev’s Russian chemistry society, Lake Baikal Protection Fund, summer schools on ecology, chemistry, economics, physics and mathematics.

On the basis of the Institute there is training of specialists at 4 departments of the Buryat State University.

Corresponding member AS USSR M.V. Mokhosoyev and academician V.A. Koptyug

Meeting of the scientific council

FOR THE ANNIVERSARY OF THE INSTITUTE

Anniversary of the Institute is a certain mark which sums up its professional activities, starts the search for new directions, and determines its rating among colleagues. Twenty years is not long for a man, but long enough for a science team, which has gone through different reforms not once, and which began the same year as the new Russia.

The Baikal Institute of Rational Nature Management SB RAS (predecessor of BINM SB RAS) was founded on the initiative of academician V.A. Koptyug by the Decree of the Presidium of the Siberian Branch of the RAS of 27 March 1991 №95 on the basis of the Baikal Department of Nature Management problems and the Department of social economic research of BSC SB AS USSR.

With reorganization of the academic institutes of the Siberian branch of the RAS in 1997, the Baikal Institute of Rational Nature Management SB RAS was joined by Chemistry Department of the Buryat Institute of Natural Sciences, but then the Institute was renamed into Baikal Institute of Nature Management SB RAS (the Decree of the Presidium SB RAS 06.11. 97 №409).On this Decree the Baikal United Institute of Nature Management (BUINM) SB RAS was founded as a member of the Baikal Institute of Nature Management (BINM) SB RAS and Chita Institute of Natural Resources (CINR) SB RAS. In 2001, it was again divided into the Baikal Institute of Nature Management SB RAS and the Institute of Natural Resources, Ecology and Cryology SB RAS (Chita).

The main areas of the activity of BINM SB RAS were determined by the Decree of the Presidium RAS of 22 April 2008 №256:

- nature management problems: interaction between natural and social-economic system;
- chemical elements and compounds in natural and artificial environments;
- creating new materials and resource-saving, environmentally-safe technologies; chemical aspects of rational nature management.

The main research object is the Baikal region, first of all, the World Natural Heritage Site — Lake Baikal and also Northern Asian bordering territories for which the scientific substantiation for sustainable (balanced) society development is being developed, with the use of environmentally-safe technologies, reducing anthropogenic impact on the environment.

Opposed to traditional sectorial approach, the solution of the tasks is worked out on the basis of the system, relying on interaction of society, nature and new technologies.

DEVELOPMENT STAGES

FORMATION YEARS

Academy of Science of the USSR
SIBERIAN DEPARTMENT, LENIN'S ORDER AWARD
PRESIDIUM

DECREE

03/27/1991 #95

Novosibirsk

[About organization of BIC SB AS]
USSR

For the purpose of reinforcement of researches on defense and conservation of natural systems in Lake Baikal basin, and on the problems of social and economical development of the region, in compliance with the decree of CK CPSU and of the Council of Ministers of the USSR, on April 13, 1987, № 434, "About measures for provision of defense and conservation of natural systems in Lake Baikal basin in 1987-1995", and with the decree of the Council of Ministers of the USSR, on May 26, 1990, № 525, "About development of the Siberian department of AS USSR till 2000", the Presidium of the Siberian department AS USSR RESOLVED:

1. To create in Ulan-Ude Baikal Institute of Conservation (BIC SB AS USSR) on the basis of Baikal department of nature management problems and of the Department of socio-economical research of Buryat Scientific Centre of SB AS USSR; to exercise in statute-established order transfer of workers of the latter departments to the newly created institute.
2. To consider as the main scientific directions of the Institute the following:
   - Development of scientific foundations for monitoring and forecasting of natural and anthropogenic transformation of natural environment in Lake Baikal basin.
   - Research on the problems of socio-economical and natural systems interaction.
   - Regional economics and methods of its optimization under special conditions of nature management.
7. To confirm the planned amount of BIC as 300 workers.
8.2. To provide in 1991 additional financing of projects relating to Baikal research area within concerted size by BIC SB AS USSR.
12. To assign the Central Administration of scientific research organization (V.D. Ermikov) to control realization of this decree.

Chairman of the Department
Academician V. A. Koptyug

Head scientific secretary of the Department
Corresponding member of AS USSR U. D. Tsvetkov


КАК ЭТО БЫЛО

ЛЕОНИД КРАВЧУК: «КОГДА БЕЛОВЕЖСКИЕ СОГЛАШЕНИЯ БЫЛИ ПОДПИСАНЫ, ЕЛЬЦИН ПОЗВОНИЛ БУШУ И СКАЗАЛ:

«ГОСПОДИН ПРЕЗИДЕНТ, СОВЕТСКОГО СОЮЗА БОЛЬШЕ НЕТ»

В резиденции, где ровно 15 лет назад была поставлена точка в истории советской империи, теперь расположены спальни президента Беларуси и членов его семьи

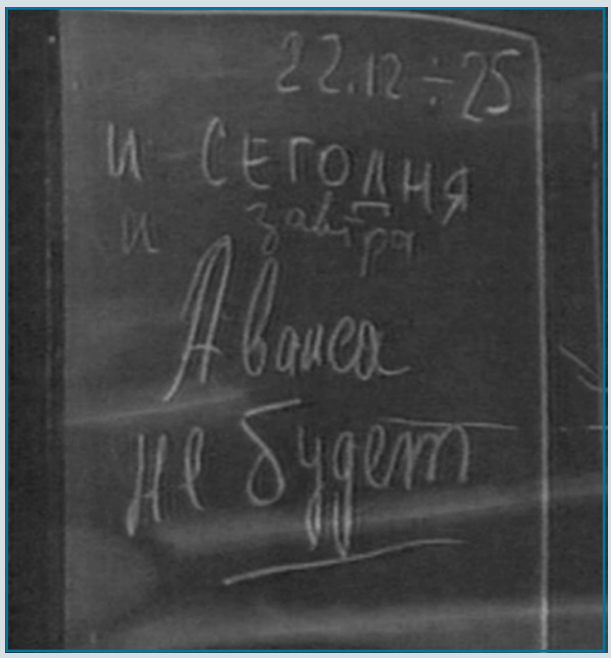
Если после объединения Германии историческими символами стали осколки Берлинской стены, то для нас, бывших граждан СССР, самой дорогой реликвией периода развала советской империи, наверное, может быть старая печатная машинка директора Беловежского заповедника Сергея Белюка. Именно на ней 8 декабря 1991 года в резиденции Никиты Хрущева «Вискули», недалеко от Бреста, в районе Беловежской пущи, был отпечатан текст соглашений, впоследствии преобразовавших весь мир. Эти соглашения, подписанные Президентом Украины Леонидом Кравчуком, председателем Верховного Совета Белоруссии Станиславом Шушкевичем и президентом РСФСР Борисом Ельциным и позже ратифицированные в парламентах союзных республик, поставили точку в истории СССР.

Где сейчас хранится эта машинка, доподлинно неизвестно. Вполне возможно, что президент Беларуси Александр Лукашенко, который инициировал денонсацию Беловежских соглашений, распорядился спрятать этот своеобразный символ свободы от белорусского общества. Но память о тех двух днях, когда лидерам трех братских славянских народов понадобилась простая печатная машинка, жива. Спустя пятнадцать лет один из авторов Беловежских соглашений, первый Президент Украины Леонид Кравчук, которому хватило мужества назвать вещи своими именами и констатировать: СССР де-факто перестал существовать, — поделился с «ФАКТАМИ» своими воспоминаниями о событиях, позволивших предотвратить возможный в то дни опасный кровавый сценарий.

8 декабря 1991 года. Леонид Кравчук, Станислав Шушкевич и Борис Ельцин объявили о создании Содружества Независимых Государств

1991

1993



1994

In our days not all the research workers remember the time when salary and facilities had been delayed for months. Only support of the Presidium of the Siberian Branch RAS and its heads academicians V.A. Koptyug and N.L. Dobretsov helped them to go through difficult years, determine modern subject areas, create necessary laboratory base.

The study of Baikal problems and conservation of Lake unique ecosystem have always taken special place in plans of the Siberian Branch of RAS.

After Rio-de-Janeiro summit in 1992, many countries began to put into practice state and regional models of sustainable development where economic interests of society are integrated with ecological tasks.

This kind of problem has become the discussion subject at the international conference of the Scientific Committee NATO in 1994 "Baikal as a World Model Territory of Sustainable Development". Its suggestions were taken as a basis for including Lake Baikal into the Register of Places of the World Natural Heritage and, for the first time in Russia, nature conservation law for a separate territory "On Lake Baikal protection".

On the task of Russian Government in 1991 and 2000 the Institute headed the work on federal objective programs on protection of Lake Baikal ecosystem and the rational use of its basin natural resources, many subordinate acts of the federal law "On Lake Baikal protection". It takes active participation in realization, the biggest in the country, special economic zone of tourist-recreational type "Baikal harbor". In the agriculture of Zabaikalie there is widely used the system of adaptive agrarian nature management developed in the Institute, restoring main principles of nomad animal breeding of the migrant peoples of the Great Steppe.

Over these years the research workers of the Institute have been granted more than 60 patents for new developments in the field of material science, new technologies of crude ore concentration and minerals extraction, purifying natural water and industrial waste water.

The Institute has created the unique database of official documents, regulating nature management processes and the protection of the Baikal region environment.

Over three seasons had lasted the scientific expedition of the deep-water manned submersibles "Mir" on Baikal that greatly contributed to the study and economic development of the Baikal region.

Expedition of the deep-water manned submersibles "Mir" on Baikal, 2008–2010

DIRECTORY DOCUMENTS ON "BAIKAL" PROBLEMS

Council of Ministers of RSFSR
Decree № 652
May 9, 1960
Moscow, Kremlin
"About protection and use of natural resources in Lake Baikal basin"

Council of Ministers of USSR
Decree № 52
January 21, 1969
Moscow, Kremlin
"About measures for protection and rational use of natural complexes of Lake Baikal basin"

CK CPSU and of the Council of Ministers of the USSR
Decree (summary)
June 16, 1971
Moscow, Kremlin
"About additional measures for providing of rational use and preservation of natural resources in Lake Baikal basin"

CK CPSU and of the Council of Ministers of the USSR
Decree № 679
July 21, 1977
Moscow, Kremlin
"About measures for further providing of protection and rational use of natural resources in Lake Baikal basin"

CK CPSU
Council
July 28, 1988
On the question of conservation of natural resources in Lake Baikal basin

A.K. Tulokhonov. Baikal problem: history and documents, 2010

It is important to note that since the establishment of the Institute, the research areas of its activity have not repeated the ones of other Earth science institutes and avoided traditional multisectoral regional scientific establishments. In their works our scientists rely on system approach — any natural object is considered as a complex open system, in which the most economic efficiency is achieved with the use of science-consuming environmentally-safe technologies.

Naturalists, social scientists and chemist-technologists take participation in most scientific projects. The authority of the Institute and the high professional level of the specialists allow to give expert, environmental-economic and technological assessment of all large objects and plans of social-economic development, related with natural resources use on the territory of the Baikal region.

From the beginning of the establishment, the Directorate and the Academic Council of the Institute have been in close cooperation with the regional and federal government bodies, have been studying public opinion about problems of environmental protection and of rational use of natural resources. The new way of the Institute development has become business-scientific partnership with IFC "Metropol" that made it possible to realize the large-scale project of manned water-deep submersibles "Mir" on Baikal

The Institute has always operated on the principle of free laboratories and initiative research projects in which interests of specialists of different areas can be met. This sphere of interests included archaeological researches, history of agriculture, dendrochronology, study of paleoclimate, chemistry of natural system, artificial and natural polymers etc.

At present, the area of research includes political geography of Asian Russia and bordering countries, deltas of Asian Rivers, new chemical materials of special purpose, chemistry of medicinal plants, special economic zones, organic agriculture, design of strategy mechanisms of social-economic development of a region with ecological limitations, study of regional clusters and peculiarities of formation and population migration taking into account border factors.

Over these years on Baikal there has been built and functioning all year-round hospital — international ecological educational centre "Istomino" that on its basis scientific expeditions and conferences, summer schools for gifted children are organized. In the Institute was created modern instrument-analytic base enabling to carry out researches on world level.

The booklet about IEEC "Istomino", published in 2010

Letter of Commendation to the Baikal united insitute of nature management SB RAS

The special merits of the Institute are the publication of the fundamental encyclopaedic guides “Baikal: nature and people”, “Buryatia: nature, society, economics”.

For the purpose of ecological upbringing and population education from 2004 there have been published more than 30 issues of popular science environmental magazines “Baikal World”.

Any anniversary is an assessment of merits of those people who contributed to the formation of the Institute and its scientific potential. Among them B. R. Buyantuyev, I. M. Zandanov, D. D. Mangatayeva, M. V. Mohosoyev, K. A. Nikipforov, A. A. Izineyev, I. T. Pavlov, G. S. Radnayev, P. Z. Handuyev and many others, who defined the main areas of modern researches.

The present booklet informs the reader about the completion of the certain stage of the Institute development. The scientific personnel are thankful to those who helped them in their professional growth and hope for further partnership. We are full of new plans and new future scientific achievements are growing in our laboratories open for partnership, conferences and expeditions.

Director, corresponding member RAS,
Honored scientist of Russian Federation,
Honorary citizen of Ulan-Ude,
The People’s Khural deputy of
The Republic of Buryatia
Arnold Kirillovich Tulokhonov

Director of BINM SB RAS,
Corresponding member RAS A. K. Tulokhonov

BINM SB RAS celebrates the 10th anniversary, 2001

ABOUT THEORY OF NATURE MANAGEMENT

Rational nature management is one of the ways of achieving balanced development of a society in accordance with the principles of sustainable development. In the final documents of the conference on environmental protection and development (Rio de Janeiro, 1992) we specially outline the following conditions:

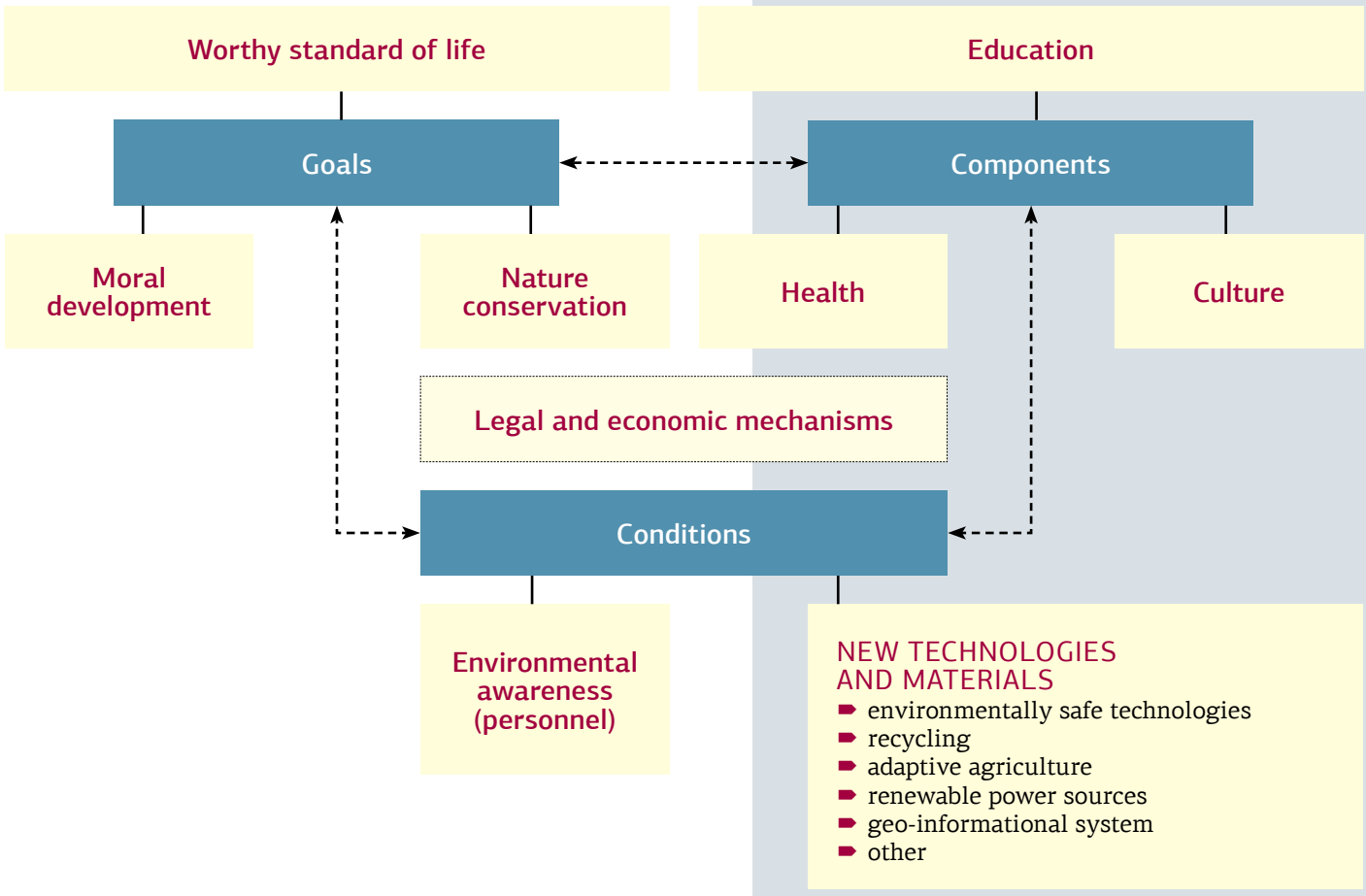
- in the centre of attention must be people with the right to healthy environment and harmony with nature;
- environmental protection must become the integral part of development process and cannot be considered in isolation from it;
- development must equally provide needs of present and future generation;
- it is necessary to reduce living standards gap between the rich and the poor;
- all governments are sovereign in the use of their natural resources but responsible to world community for possible negative consequences;

One of the formulations determines rational nature management as a science focusing on knowledge about interaction between society and nature for the purpose of development eco-safe economics, including interests of future generation. Practically, this task comes to the search of compromise between increasing consuming capacity of natural resources and environmental protection. The most optimal way of its solution is to work out new technologies, materials and eco-economic mechanisms regulating nature management, reducing anthropogenic impact.

This task determines the necessity of three main areas development in the Institute linked with the study of nature, socium and new technologies, integrated for the purpose of sustainable development of a society. This theory is fully reflected in the structural scheme.

Any natural object or social system regardless of scales and economic priorities, claiming to develop in harmony with ecological laws must comply with the basic principles. It is quite clear that every element requires a big number of specialists' efforts. Nevertheless, the task is possibly fulfilled only with the system approach to all elements of the scheme below.

PRINCIPLED STRUCTURE OF REGION SUSTAINABLE DEVELOPMENT STRATEGY



MAIN RESULTS OF FUNDAMENTAL RESEARCH PROJECTS

RESEARCH AREA: *"Nature management problems: interaction between natural and socio-economic systems"*

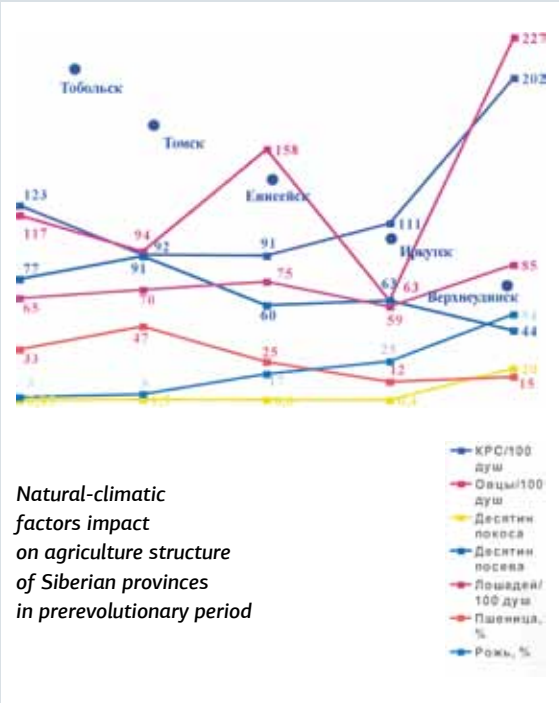
The study of natural complexes as society habitat. In contrast to scientific organizations studying separate earth sciences, our researches consider natural resources first of all as a man habitat, in a considerable degree determining his being.

For these purposes the historical experience of interrelations of nature and society of nomadic peoples of the Great Steppe has been considered. On its basis there has been worked out the system of the adaptive agrarian nature management that allows in the most effective way to use dry steppe landscapes of Northern Asia for the development of productive forms of nomadic animals.

The retrospective analysis of the prerevolutionary agricultural production of the provinces of Tobolsk, Tomsk, Yeniseysk, Irkutsk and Zabaikaliye most vividly shows the adjustment of private household to severe natural-climatic conditions of Siberia. Gradual decrease of activity of Atlantic cyclone in the eastern direction determines the decrease of wheat crops but the areas of rye increase, the least adjusted to weather conditions. Zabaikalye, as the driest steppe zone has always been characterized by the high concentration of livestock.

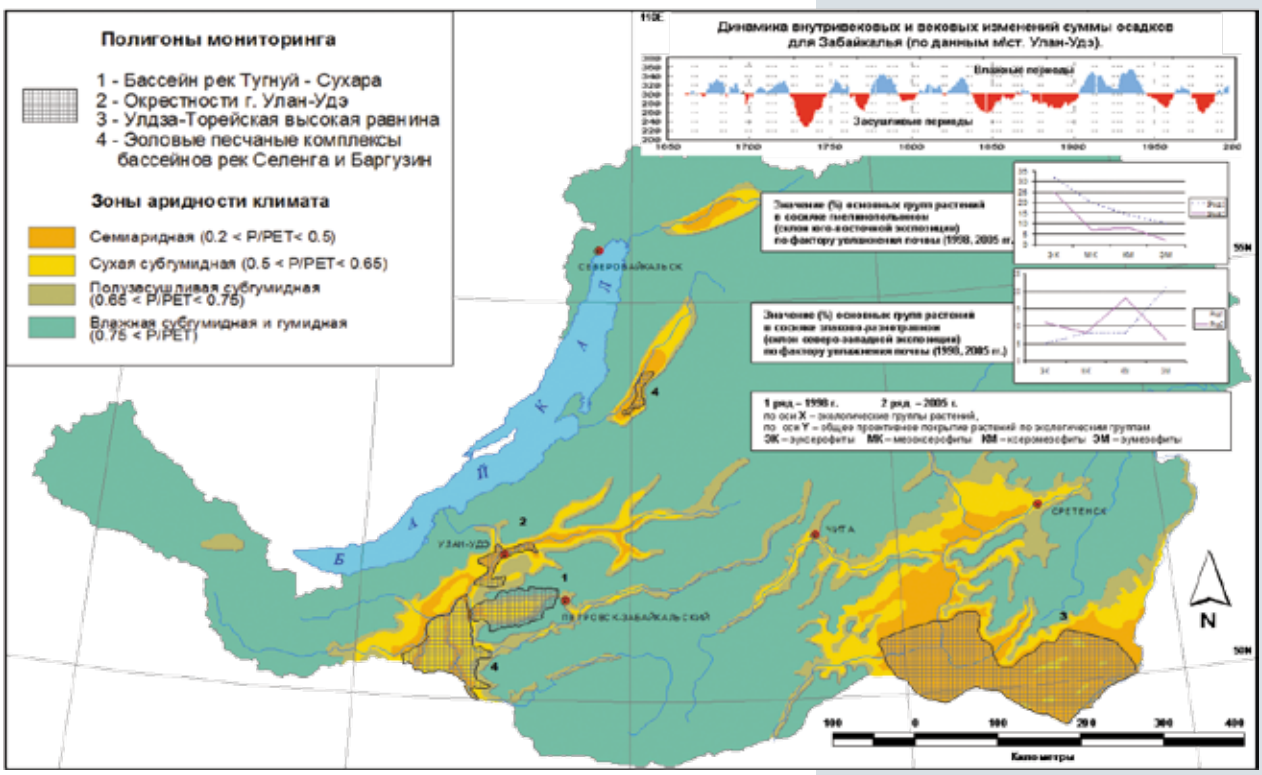
On the research of the cryorid landscapes of Zabaikalye and Central Mongolia, there have been found territories of anthropogenic and natural desertification and their dynamics in their modern climatic conditions.

With the help of distance methods of research, cartographic and mathematical models the mechanisms of the development of erosion microforms of reliefs have been determined. For mapping of desertification processes, the integral criterion, involving the total row of climatic and anthropogenic rates, has been suggested.



Natural-climatic factors impact on agriculture structure of Siberian provinces in prerevolutionary period

Climate aridity zones of Zabaikalie and polygons of monitoring



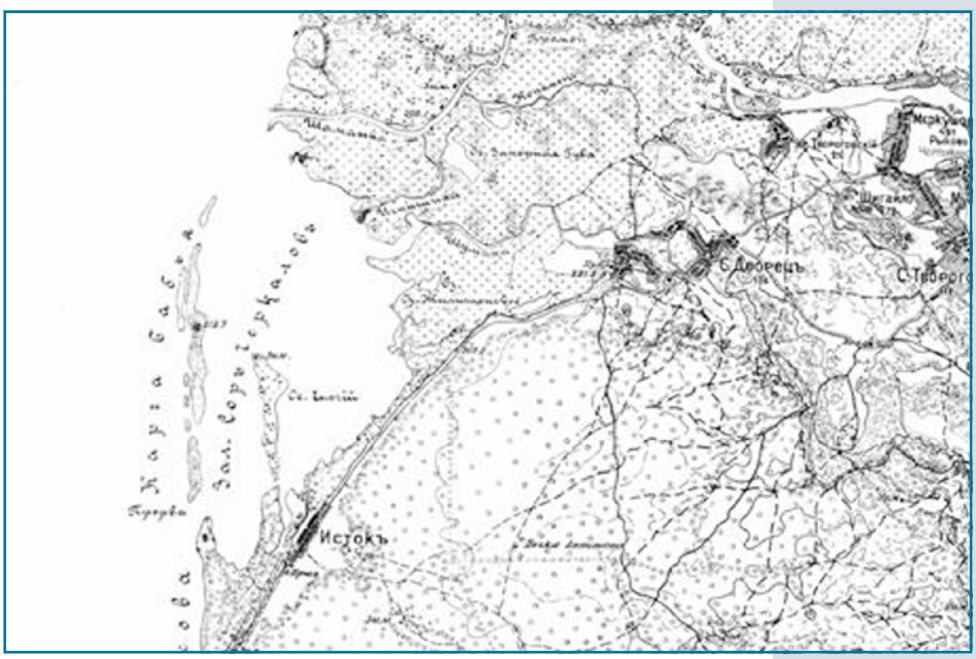
Based on the results of drilling bay Proval in the Selenga River delta and the dendrochronological reconstructions, there has been created microchronicle of natural events of up-to-date time, including reflected in rock-drill mountings with the presence of resisting organic pollutants and products of half-decay radionuclide.

There has been created the bank of the retrospective cartographic materials (publications of 1880–1925), enabling to obtain the first instrumental space-time concepts about dynamics of ecosystem changes at the level of local natural landscapes and populated area. On the basis of these and other historic-archive materials, it has been suggested to determine the events of late 19th — early 20th century (building of Transsyb, Kulomzinskiy expedition) as the main basic marker of socio-natural monitoring of the Baikal region.

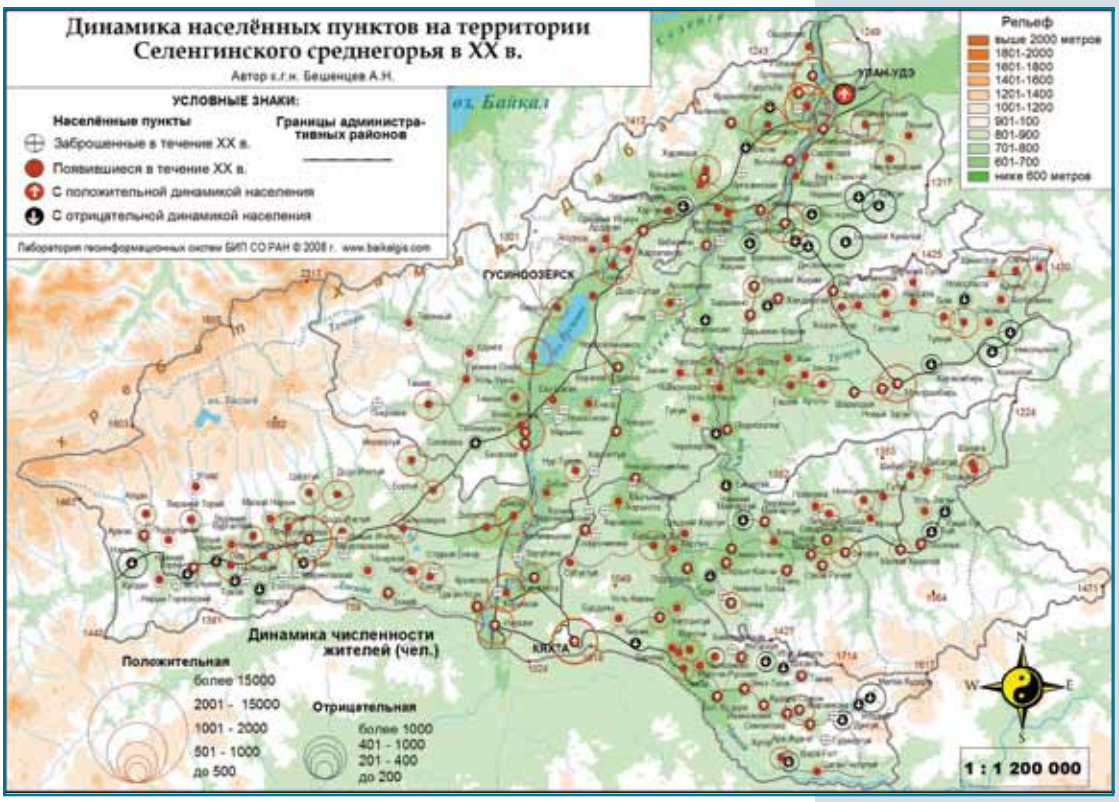
GIS, developed in the Institute, allows to keep and analyze big amount of geographical data for the purpose of atlas cartography and optimization of nature management processes.

The telecommunicational Atlas of retrospective topographic maps (www.baikalgis.ru) has been created and the method of creating geo-informational resources, based on retrospective maps, has been worked out.

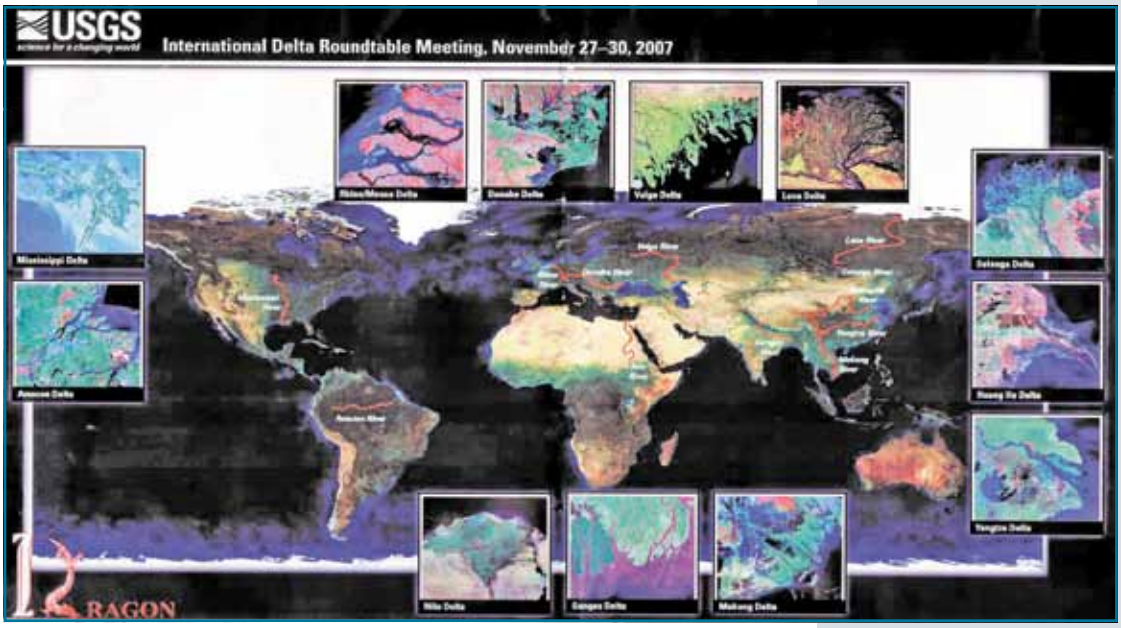
For the first time, there has been given the integrated assessment of water resources of Lake Baikal basin with substantiation of economically effective and ecologically safe water consumption under different conditions of management. The result of many years' Russian-Mongolian-Korean project has become the elaboration of the integrated model of nature management of the Selenga River basin and of the system of monitoring sources of polluting water environment. One of the results of carrying out these researches is that the Great People's Khural of Mongolia passed the law on special protection of ecosystems of Riverheads of the Selenga River basin in the regions of mining development.



Topographic maps, scale 1:84000, devised by Corps of military topographers in Eastern Siberia in 1896–1914 as the basis ofretrospective monitoring of socionatural processes



Retrospective analysis of system "man–nature" evolution on carthographic materials



The biggest River deltas in the world

In the system of geomorphological elements of natural environment for the first time there have been identified River deltas as natural geochemical barriers and indicators of ecological state of water basins on the border "River — sea". Among delta ecosystems, the delta of the Selenga River is considered to be the only classical analogue in the world, functioning in the system "River — fresh basis of erosion".

Studying paleogeography and geomorphology of mouths of the biggest River systems in the world, it is proved that in the formation of River deltas the leading factor becomes a sign and paces of the latest tectonic movements. It is found out that classical vane deltas are formed, as a rule, under the positive vector of neotectonic movements of substrate.

Cosmophoto of the Selenga River delta

The Selenga River delta

The big staff of Russian and Chinese researchers of authority for the first time carried out comparative natural-economic zoning of the River deltas of Northern Asia: Yangtze, Hwang Ho, Lena, Selenga. It was suggested according to the law of hydrology to separate the new continued River system of Selenga, Angara, Yenisey as one of the longest watercourse of the planet.

The realization of the long-term integration project together with the Lumnological Institute SB RAS, the Institute of Geography SB RAS, Geological Institute SB RAS, the Institute of General and Experimental Biology SB RAS and the Institute of Natural Resources, Ecology and Cryology SB RAS has resulted in the monograph "The Selenga River delta — natural biofilter and indicator of Lake Baikal condition" (2008).

On the basis of hydrology calculations the lag time in the basin of Lake Baikal to final water inlet in different phases of water regime has been estimated. Such models are necessary for assessment of natural-anthropogenic risks and reactions of River ecosystems under various anthropogenic impacts in the water protection zones.

Big amount of collected materials made it possible to move to the fundamental generalization of modern conceptions about natural environment of the Baikal region published as encyclopaedic reference books "Baikal: nature and people" and "Buryatia: nature, society, economics". For the first time, there has been collected and analysed in the work "Baikal problem: history and documents" all the directives of public bodies on natural complexes protection of Lake Baikal, stages and results of nature-conservative activities in the Baikal region have been distinguished.

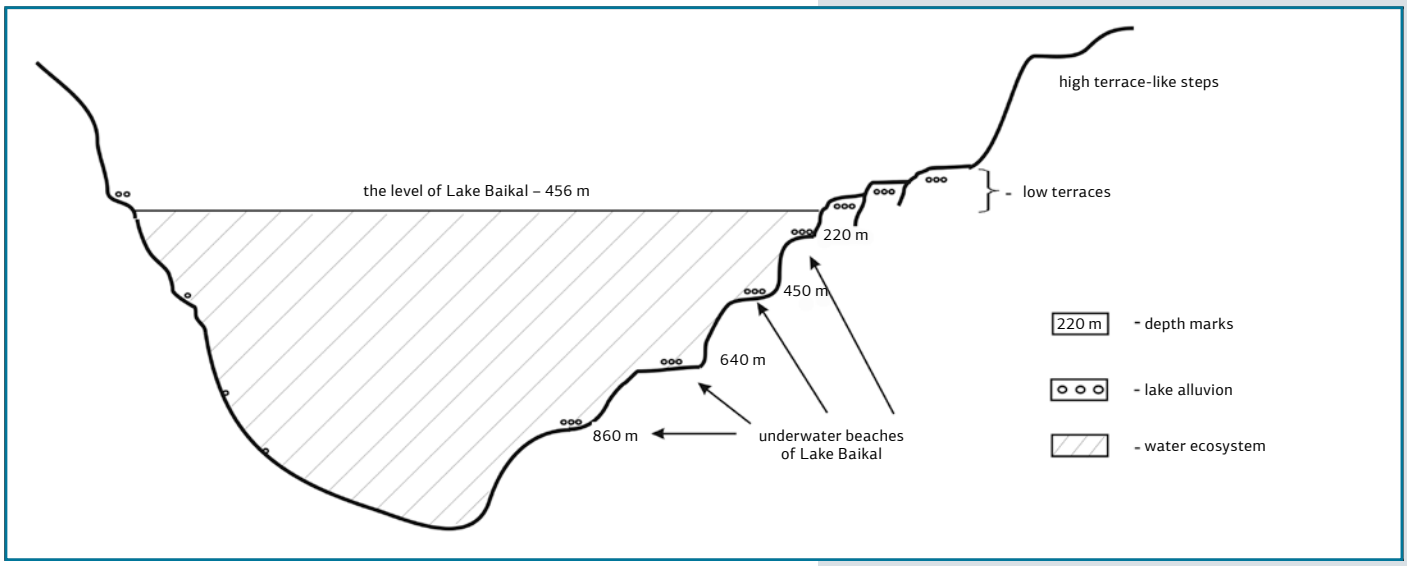
Monography "The Selenga River delta — natural biofilter and indicator of Lake Baikal condition", 2008

Encyclopaedic reference book "Baikal: nature and people", 2009

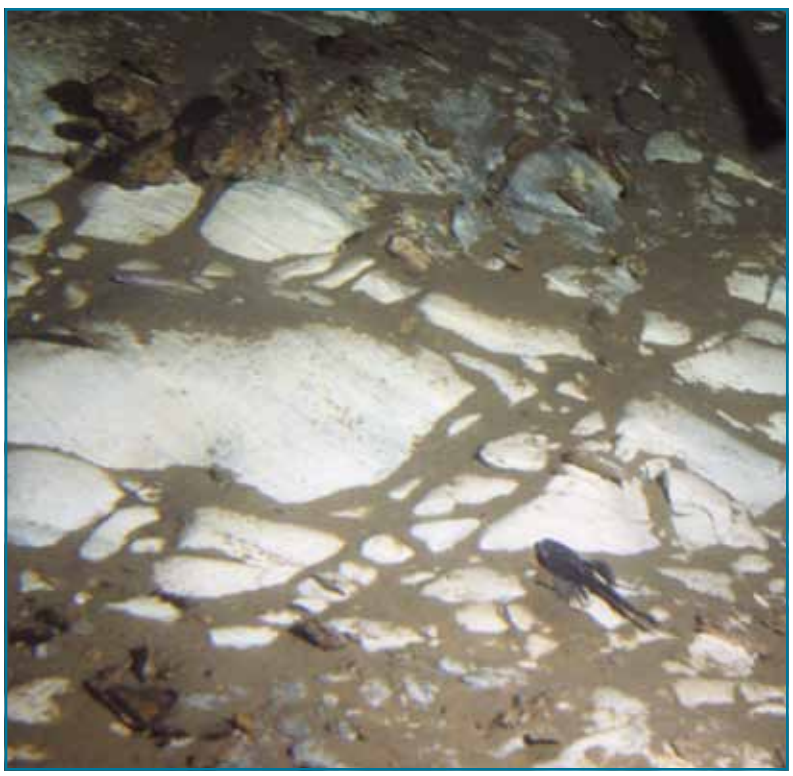
Encyclopaedic reference book "Buryatia", volume 1. "Nature. Society. Economics.", 2011

The discovery of underwater Lake beaches should be referred to the number of unique results obtained during the expedition of deep-water submersibles "Mir" on Lake Baikal. Well rounded boulder-pebbly deposit, formed as the result of ancient breakers' activities, has been found out by visual observations at various places of water area of the Lake at the depth of about 860, 640, 450, 220 m. Thus, it can be stated that the level of Lake Baikal in the ice age was significantly below the modern mark and was consistently rising in the period of glacier melting of the surrounding mountainous systems.

Visual observation through illuminators "Mir", 2008



The profile of the underwater beaches of Baikal cavity



Underwater abrasion beach

In-line pebbly deposits opposite the bay of Froliha in Northern Baikal

INTERACTION BETWEEN NATURE AND SOCIETY

For the first time, the Baikal region as an example, there have been worked out principles and mechanisms of sustainable development as the world model territory that laid down the foundations of the concept, for the first time in Russia, of federal nature conservation law for a separate region "On Lake Baikal protection" (1999)

The ways of raising economic potential of the territory with the use of environmentally-safe technologies have been determined and the methodological approaches to the calculation of compensational losses in economics, appearing under nature conservation limitations have been worked out. The methodology of the ecosystem approach to the assessment of individual species of natural resources and natural capital in whole has been devised.

The principles of elaboration of the program-objective methods and forms of management on forming of eco-economical systems in the territories with ecological limitations have been suggested. Taking them into account the natural-economic zoning in the Selenga River basin has been carried out.

On the basis of the retrospective analysis of historic-archive materials, for the first time the system of adaptive agrarian nature management has been elaborated and put into practice. The renewal of local population traditions and indigenous species of domestic animals in the conditions of cryorid climate of the Great Steppe makes it possible to increase the efficiency of grazing cattle.

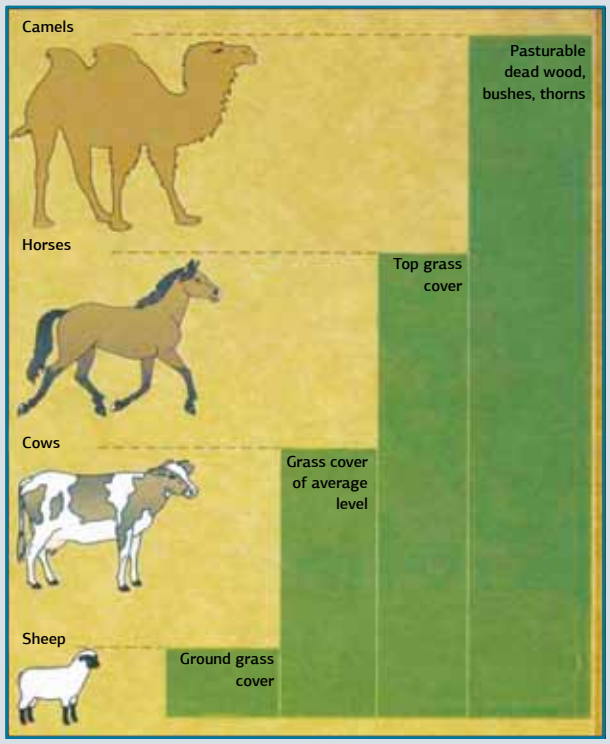
For these purposes it is necessary:

- regenerate indigenous breeds of domestic animals adjusted maximum to severe local natural conditions and lack of natural food reserve;
- develop the system of seasonal migration of cattle and grazing turnover;
- reconstruct traditions of local population with the use of modern technologies of agriculture management.

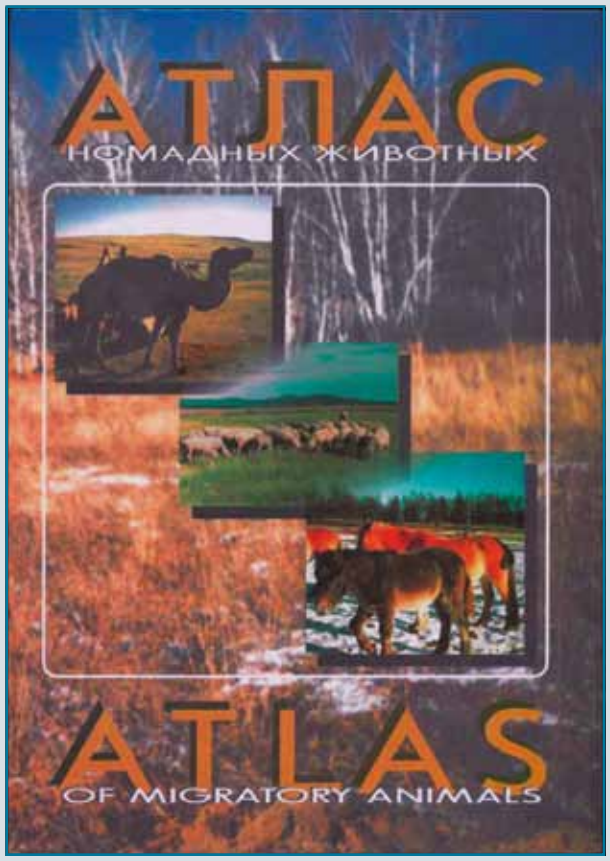
In the end three main tasks of Russian agricultural complex are solved:

- increase of efficiency of small agribusiness;
- conservation of agrolandscapes;
- local population fixation

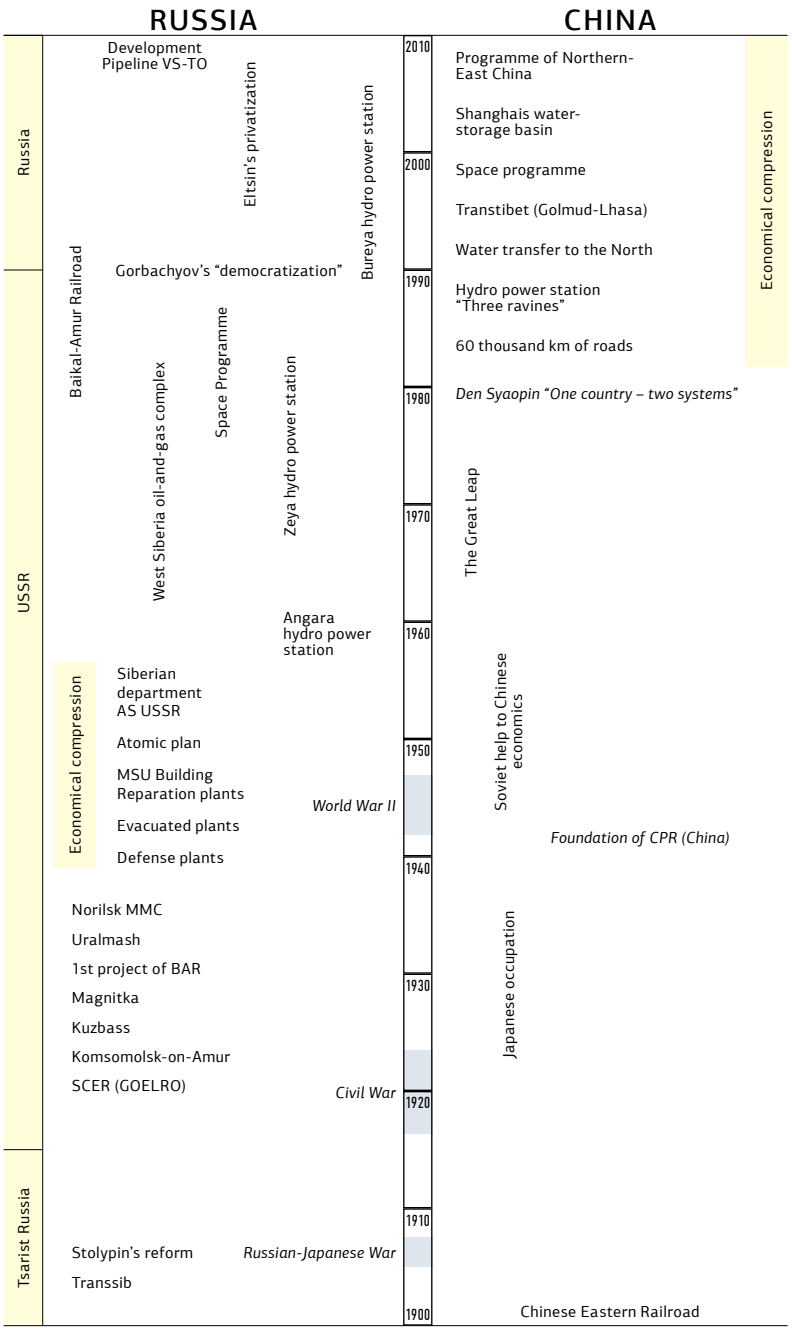
Besides, legislative prohibition of the use of chemical agents in agricultural complex of the Baikal region allows to establish here basic productions of organic food competitive in the world market.



Feeding niches of aboriginal domestic animals under traditional nature management of nomadic peoples of the Great Steppe



Monography "Atlas of migratory animals" (Russian and English version)



Economic-geographic periodization and comparative chronology of the development of Russia and China in the 20th century

Study book (monography) "Boundary and transboundary territories of Asian Russia and adjacent countries" (2010).

The comparative study of social-economic and ecological problems, processes and phenomena occurring on the bordering territories of Asian Russia is the fundamentally new area of the Institute researches.

For the first time, in the system of economic zoning of Northern Asia it has been suggested to outline marginal territories along the state borders having in common social-economic and cultural interests, similar natural-ethnic characteristics with the border regions of Kazakhstan, Mongolia and China.

The classification of state borders in the criteria of physical geography, belonging to confessions, presence of ecological and political conflicts etc. has been devised. For the leveling of economic potential of the centre and peripheral regions of Siberia and Far East it has been suggested to put into action the mechanisms of establishing "euroregions" and geographical rents that must use advantages of geographical position of bordering territories of Asian Russia.

It has been established the asymmetry of social-economic development of border regions of Northern-Eastern China and Zabaikalie, reasons and factors providing leading rate of Chinese economics.

Based on the analysis of comparatible chronicle of social-economic and political events of the 20th century following the development of China and Russia there has been outlined the factor of geographical compression of space and time as the necessary requirement of developing depressed and pioneer territories of Northern Asia.

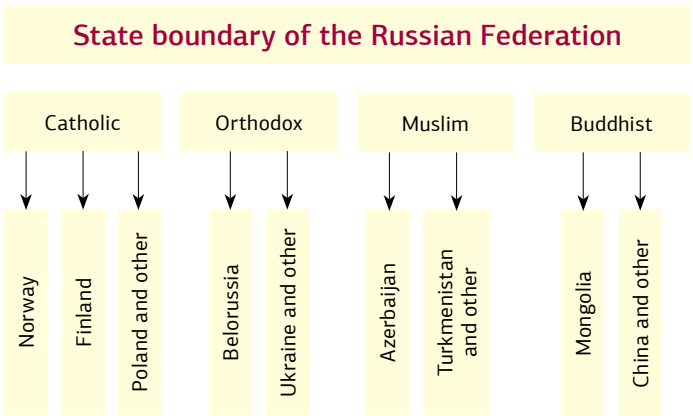
The picture below presents the efficiency of concentration of economic potential of China building priority objects in opposition to spread in time the biggest projects of the soviet time and their complete absences in the time of modern Russia.

In the end, this situation can completely fix social tie of the Russian bordering territories to Chinese economics with all the ensuing consequences. In these terms it is necessary at a legislative level to work out and fulfill the system of measures on strengthening the role of Russia in Asian geopolitical direction and in the first place through the development of marginal regions as economic vanguard.

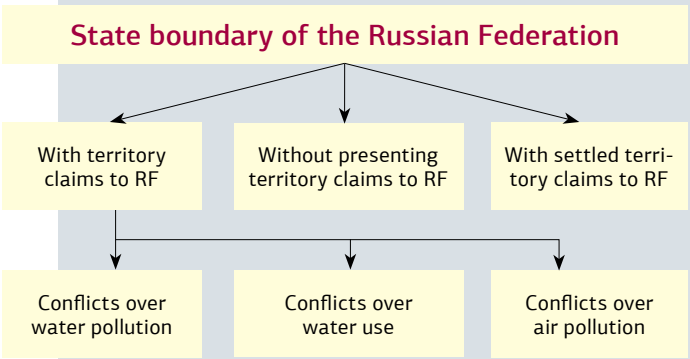
The results of these researches carried out together with 9 Institutes SB RAS, UrB RAS and FEB RAS have been published in the series "Integration projects" and passed to the structures DFA RF, the authorized representatives of President RF, the officials of executive and legislative bodies of the Ural, Siberia and Far East regions.

Within the research program of desertification processes of Northern Asia the social-economic causes and effects of structural changes of local population's lifestyle have been determined.

The absence of outlets, degradation of pastures reduce rural population of Mongolia that actively migrate to the industrial centers of the country. In the end half the population concentrate in large city agglomerations thus creating growing persistent social and ecological problems.



Religion classification of the state borders



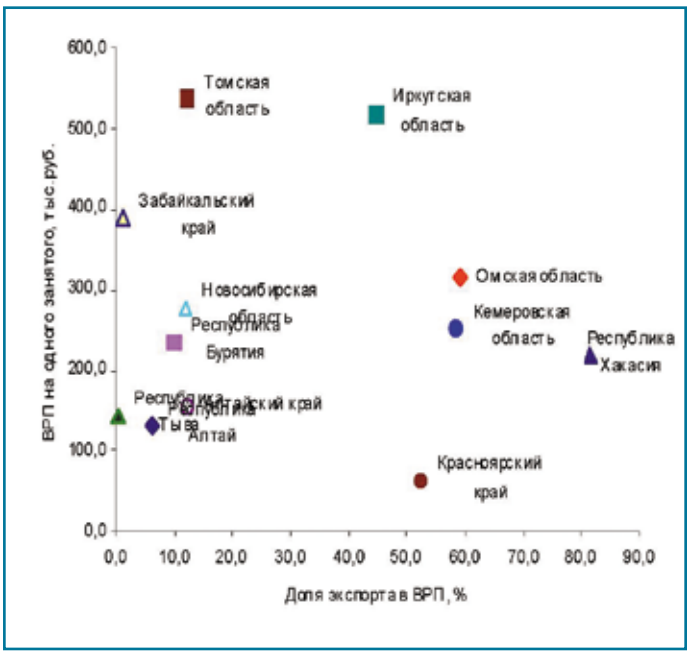
Classification of the state borders according to conflict situations

Map of frontier territories of Asian Russia.

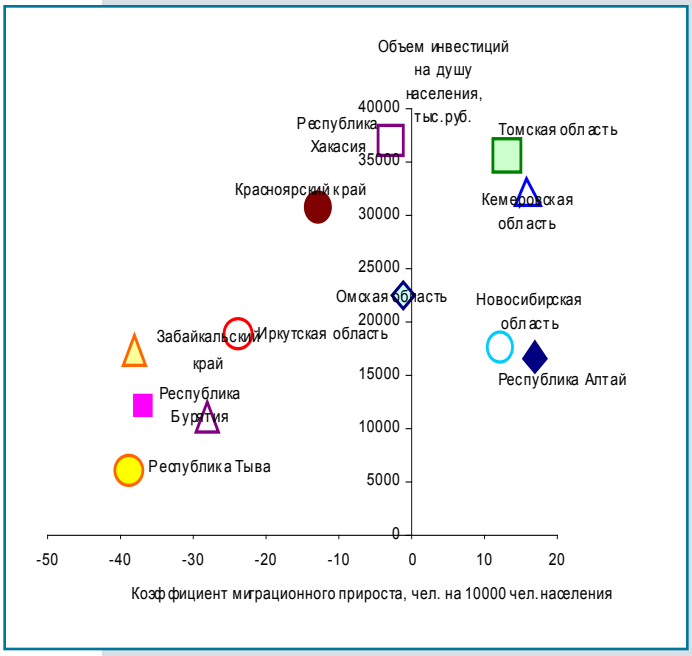
The scientific grounds for assessment of natural capital, demographic and economic resources of the Baikal region have been worked out.

The methodical grounds for forming the strategy of sustainable development of territories of subregional levels have been suggested. The method of research is based on economic, social and ecological indexation of municipal education as subsystems of economic system of a region, on building integral index of sustainable development of municipal education, differential assessment of eco-economic development of municipal education and also availability of infrastructural resources.

The assessment of region competitiveness based on determining integral indicators of infrastructure development, entrepreneurial activity situation, human potential, attractiveness of a region for investment and residence, relative readiness for competitions with other regions has been given.

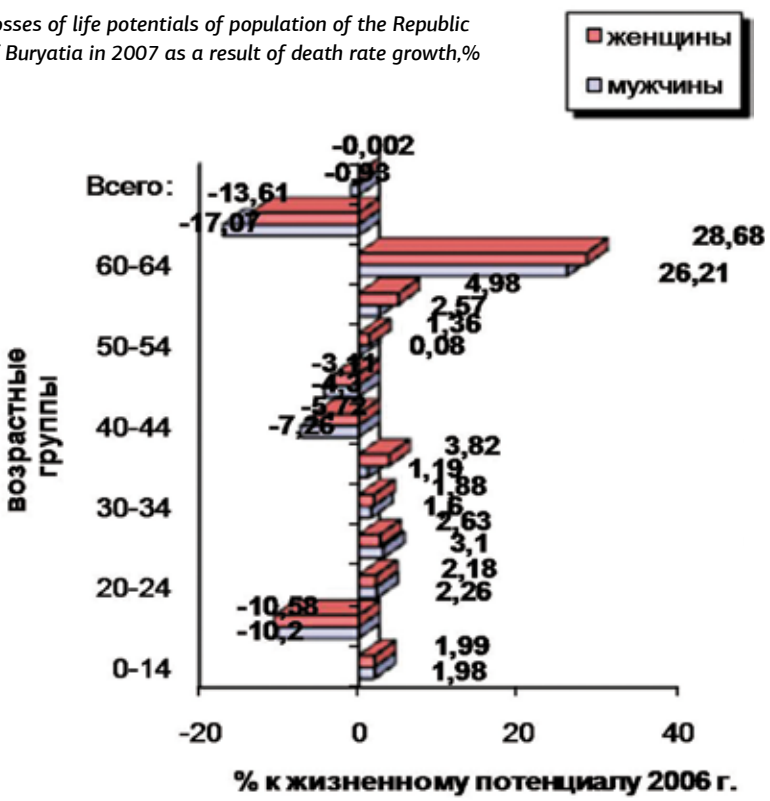


Region readiness for competition with other regions



Region attractiveness for invest and residence

Losses of life potentials of population of the Republic of Buryatia in 2007 as a result of death rate growth,%



RESEARCH AREA: "CREATING NEW MATERIALS AND RESOURCE-SAVING, ENVIRONMENTALLY-SAFE TECHNOLOGIES; CHEMICAL ASPECTS OF RATIONAL NATURE MANAGEMENT"

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La*	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac**	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg							

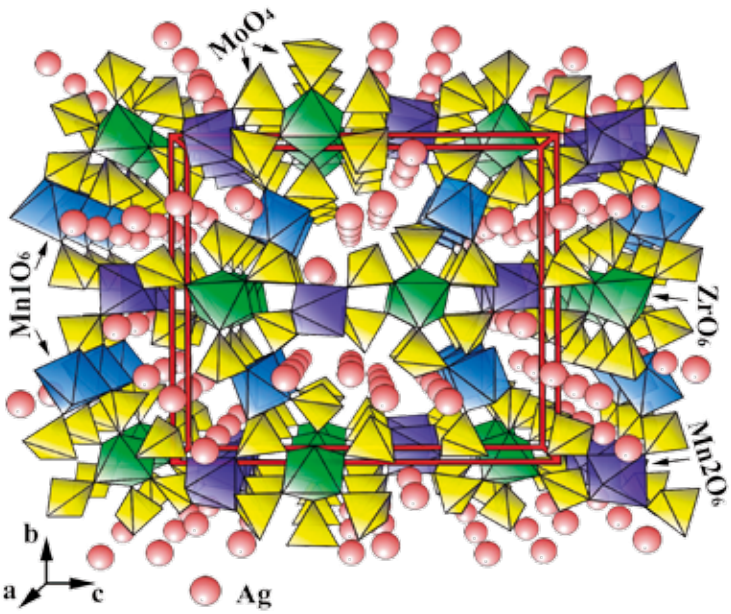
* Лантаноиды	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
** Актиноиды	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

образуют тройные молибдаты

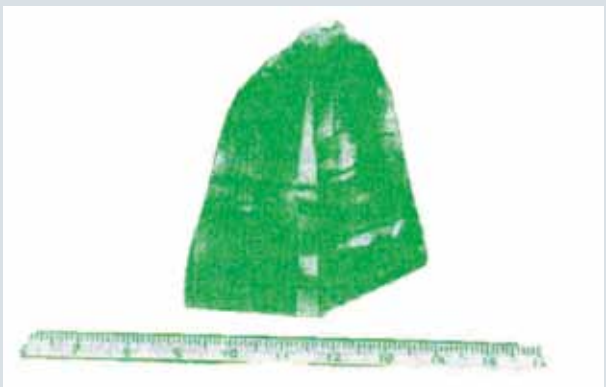
The new class of inorganic compounds — triple molybdates of various valencies is open and constantly replenishes.

The complex research of more than 300 complex oxide systems has been carried out. In cooperation with the research workers of A. B. Nikolayev's Institute of Inorganic Chemistry SB RAS, M.V. Lomonosov's MSU, the Institute of Physics of National Academy of sciences of Ukraine and the Institute of complex materials in Dresden (Germany) about 700 new oxygen-containing compounds of molybden (VI), tungsten (VI) and boron belonging to 34 structural types have been synthesized and comprehensively characterized.

Radiographic characteristics more than 170 phases entered database ICDD (International Centre for Diffraction Data)

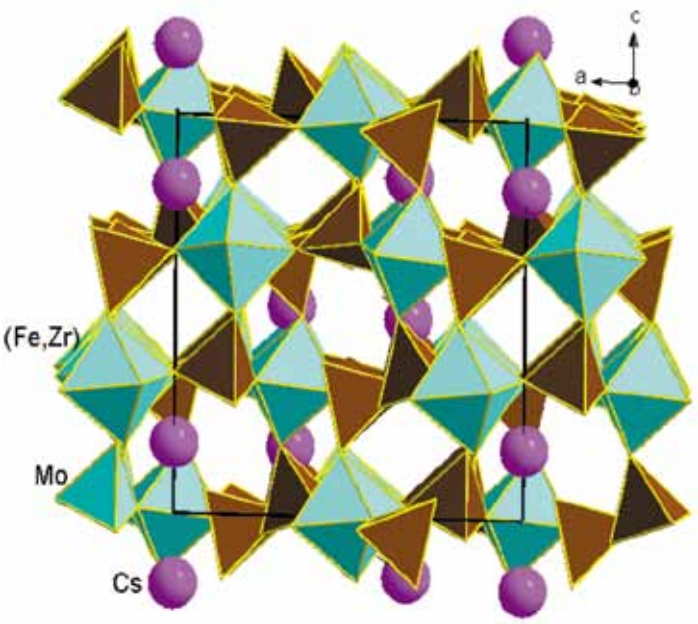


Crystal structure of ferroelectric — superionic conductor $Ag_4Mn_2Zr(MoO_4)_6$



Monocrystal of laser material $Li_3Ba_2Gd_3(MoO_4)_8$-Nd_3+.

On the basis of the revealed interrelations "composition-structure-properties" the perspective of using received compounds when forming new ferro-, piezo — and pyroelectric, luminophor, lazer and nonlinear optical materials, solid electrolytes, thermal indicators, ferromagnetic, sensing elements for sensory systems of operative monitoring of environmental parameters has been shown.



Crystal structure of ferroelectric — superionic conductor $CsFeZr_{0.5}(MoO_4)_3$

pH-sensitive hydrogel

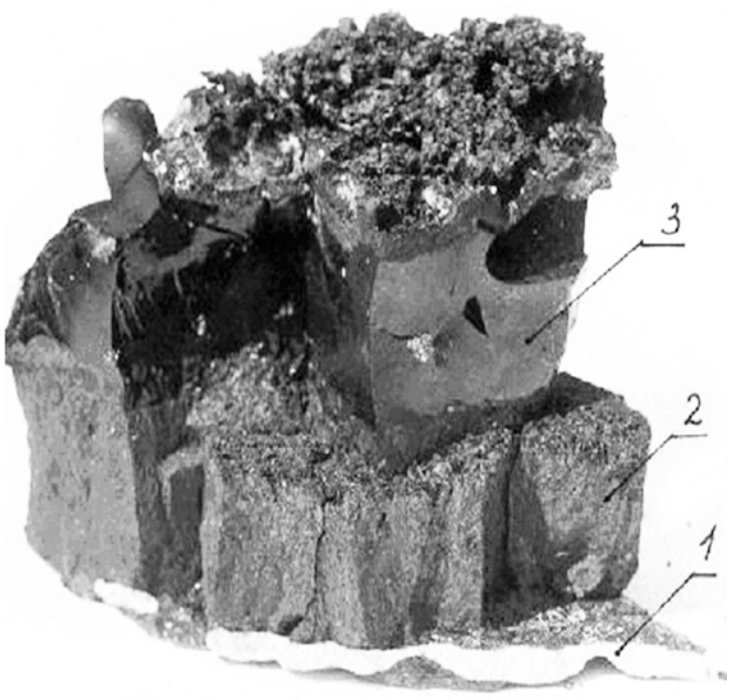
The new approach under the synthesis of polymers by rearrangement of prior received or in situ macromolecules has been devised.

Such polymers are easily processed and have high-exploitation indicators. The perspective fields of application: proton-conductive polymeric membranes, putting down layers for organic light-emitting diode matrixes.

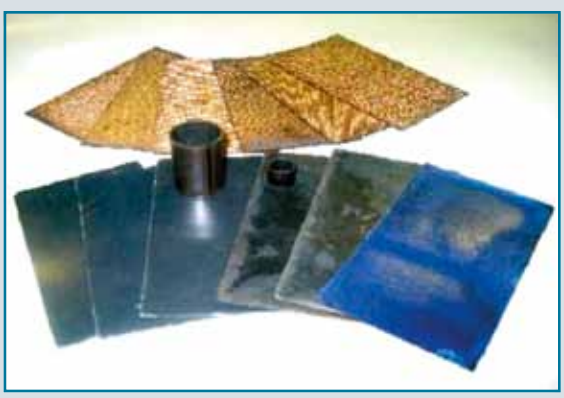
pH-sensitive hydrogels based on water-soluble polymers capable of quickly and reversibly changing their capacity depending on environmental conditions have been synthesized.

Due to the biological properties of such polymers (antimicrobial activity, low toxility etc.) it is possible to use hydrogels in the technology of living systems ... as a container for delivery of drug inside human organism.

The method of deriving laminary antifriction materials for the production of sliding support exploited in extreme conditions (PV1000 under friction without lubrication exceeds 3MPa m/s) has been patented.



Melt liquation: 1 — metal, 2 — matte, 3 — slag



Samples of laminary antifriction materials

For the first time has been established the mechanism of polymerization of structure-forming groups and germ-formation of simple salts during the process of thermal-electric melting of multi-component mineral systems with soda and salt cake bringing into the differentiation of raw material components under the formed phases of melt. Earlier unknown mechanisms of distributing non-ferrous, rare and noble metal into the phases of melt have been determined. The new resource-saving technologies of complex processing of hard-enriched molybdenic, tungsten, bismuth-silver aluminosilicate low-grade concentrates and products with receiving ready-made chemical concentrations and salts (patents №№ 2179595; 2091497; 2208059) have been suggested.

The mechanisms of mineral structural changes in the processes of burning mineral systems in the atmosphere of superheated water vapour and ore concentration allowing to control properties of split minerals under the complex processing of mineral raw materials have been established.

The pilot installation and original methods of sulphurizing of ore residual soil of Pb-Zn polymetallic deposits (patents RF №2179595, №2208059, №23064639), arsenium extraction in the low-toxic sulfide form from gold-containing arseno-pyrite concentrates (patent RF №2309187), extraction of elementary sulphur from pyrite concentrates have been devised. The realization of elaborated methods will make it possible to discover ore minerals, exploit fully raw materials and solve ecological problems.

Lead-zinc concentrate oxidized and sulfide

Oven for stem-gas burning

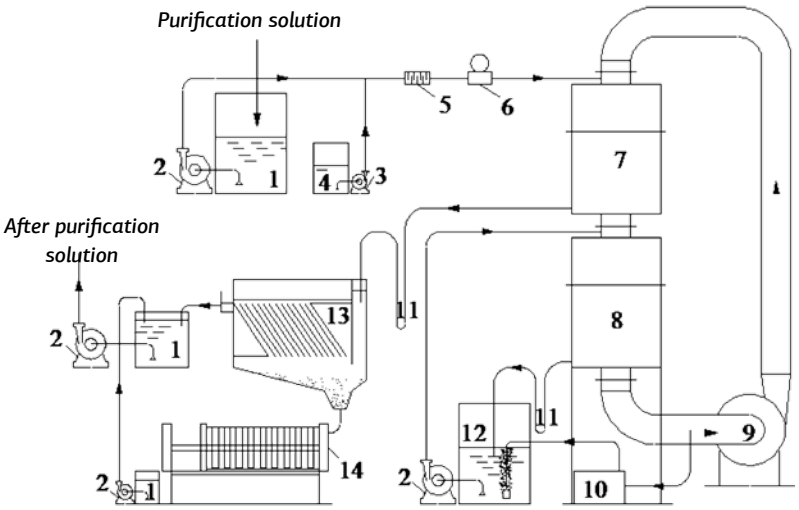
For the first time the mechanism of directed transformation of silica-alumina minerals with their restructuring under burning-caking cynirit with chalkstone and following sulfuric acid division of isomorphic elements has been established. It has been found out that extraction from mineral matrix this or that isomorphic element depends on changes of acid-base conditions of interactions between elements within matrix. The resource-saving combined technological scheme of complex processing of cynirit and bauxite with receiving alumina, potassium-sulfate and Si-stoff has been devised and it allows to fully exploit raw material, reduce consumption of chalkstone and soda, exclude process of desiliconization of liquid, decrease material flux and simultaneously extract Rb, Cs and Ga (patents RF №№142193; 2078038).

The activity of silica-magnesia species — dunite has been determined and it has been found out that under heat and humidity processing of optimal compositions of dunite with cement the tight cementing frame is formed so that it can be used in the production of frost-resistant mixed binding compositions. The new types of cement have been developed: portland cement with mineral additives with mark M400D20, mixed cements (patents RF №2288899, №2320592) and heavy-weight concrete (patent RF №2372306).

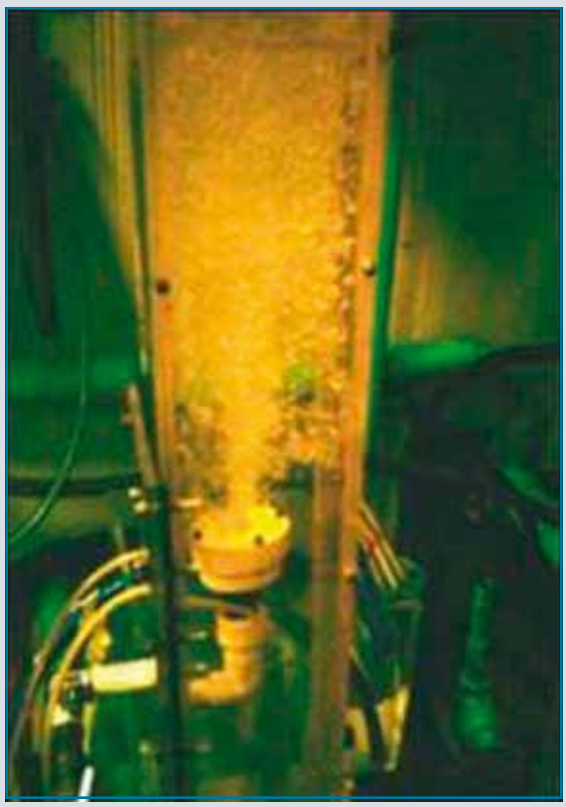
It should be noted that the basis of such cement is stripping species of cynirit deposit in the zone of Baikal-Amur Rairoad. Thus, production and transportation expenses of dam construction planned by Mox hydropower station are significantly reduced.

The physicochemical basics of directed modification of surface properties of oxidized minerals of lead-zinc ore by the methods of sulfidization under their mechanical activation in the rod mill in the presence of sodium polysulfides for contrast increasing of technological properties under following flotation enrichment have been worked out. The mixed technology of processing of oxide and mixed lead-zinc ore (patents RF №2179595; №2179596) has been created.

Samples of cements on the basis of dunite



Regeneration system NaCN:
1 — intermediate container;
2 — pump;
3 — pump-dosimeter;
4 — tank for acid;
5 — mixer;
6 — pH-meter;
7 — desorber CBA;
8 — absorber CBA;
9 — ventilator;
10 — vacuum-pump;
11 — water lock;
12 — tank for alkaline absorbent;
13 — thin-layer separating tank;
14 — filter-press



Experimental stand with generator of low-pressured hydrodynamic cavitation of jet type

The scientific grounds for the new technology of liquid waste neutralization of hydrometallurgical processing of gold-containing concentrates providing for the combination of regenerational and destructive clearing methods allowing to fulfill efficient processes of blowing and absorption of cyanic hydrogen in the centrifugal-bubbled apparatuses (CBA) and oxidative destruction of leftover impurities, ensure return of purified water, cyanides as alkaline solution NaCN to production, reduce consumption of oxidizer (more than 50%) for neutralization of toxic components (patents RF №№2310614, 2366617, 2389695) have been worked out.

The conditions of catalytic destruction of toxic pollutants of natural and waste water by the mixed iron-peroxide methods have been grounded and experimentally confirmed. The new ways of clearing waste water from hard oxidizable organic compounds have been elaborated so that it is possible to realize efficient oxidation of organic impurities under minimal consumption of oxidizer at the expense of intensification of processes provided with synergic effects appearing under additional ultraviolet irradiation or cavitation attack (patents RF №№2305664, 94564, 92008).

The content of carboxyl and phenolic groups in the oxidated brown coal and humic acids has been established. It has been shown that in humic acids prevail carboxyl groups over phenolic hydroxyls, for that reason solution of alkali destroy more efficiently complex relations between organic and mineral ingredients of coals in comparison with ammonia water.

With the methods of carbonization and chemical activation of oxidated brown coal have been received nitrogen-containing active coals of various technical uses (patent RF №2229460). The technology of production of organic fertilizer by the methods of mechanochemical activation of brown oxidated coals and phosphorites has been devised.

The way of physicochemical and technological microwave extraction of lipophilic and hydrophilic bioactive substance from vegetable raw materials by ethanol, aqueous-alcoholic and aqueous solution has been created. The non-waste energy — and resource-saving technology of complex processing of seeds and cedar pine cones, fruit-berry materials, timber-processing wastes with the production of ecologically fine vegetable and essential oil, products of food and functional uses, BAD, sorptional and technical materials has been developed (patents RF №№2194070, 2351641, 2322067, 71059).

RESEARCH AREA: "CHEMICAL ELEMENTS AND COMPOUNDS IN NATURAL AND ARTIFICIAL ENVIRONMENT"

For the first time the data on polluting the ecosystem of Lake Baikal basin with stable organic pollutants (SOP) — chloroorganic pesticides (CPP), polyaromatic hydrocarbons (PAH), polychlorinated biphenyl (PCB), polychlordibenzodioxins/dibenzylfuran (PCDD/PCDF), polybromated diphenyl ether (PBDE) and chlorophenol have been received. The content of SOP has been determined in the surface natural water, bed silts and other bioindicators of pollution: man, Baikal seal Pusa sibirica, pike Esox lucius, clam Colletopterum ponderosum sedakovi. The sources of entry of SOP the Lake basin have been identified.

Based on morphological, physiological indications and analysis of sequence of gene 16s pDNA has been identified microorganism-destructor 2,4-dichlorphenol (2,4 DCP), such as Bacillus cereus, extracted from silt of pond-aerator of Baikal pulp and paper plant.

The combined method of chlorophenol destruction in water solutions by ultraviolet (UV) radiation of XeBr-excilamp (282 nm) with further processing of products of photolysis by culture B. cereus has been suggested. Maximum efficiency of chlorophenol decomposition is 95%, along with it the utilization of the main products of photolysis is achieved.

It has been established that the use of combined effect of ultraviolet radiation of excilamps and nanoparticles TiO2 is highly efficient for both SOP destruction and inactivation of pathogenic microflora (patent №101634, published 27.01.2011, bulletin №3; patent №2404814, published 27.11.2010, bulletin №33; patent application RF №2009130946, affirmative decision of patent grant of 01.09.2010).

One of the most important characteristics of physiological biochemical indication of organism states and population is lipidic indicators. Baikal seal as a locking link in the trophic chain of Baikal — the important bioindicator of ecosystem condition of the Lake. The main attention in the field of research of fatty-acid lipidic composition of Baikal hydrocole is given to carrying out the comparative analysis of fatty-acid composition of Baikal seal. Within joint research with the University in Bergen (Norway), Yoensuu (Finland) for the first time has been carried out the comparative analysis of fatty-acid (FA) composition of hypodermic fatty tissue of Baikal seal with annulate seal inhabiting North Sea.

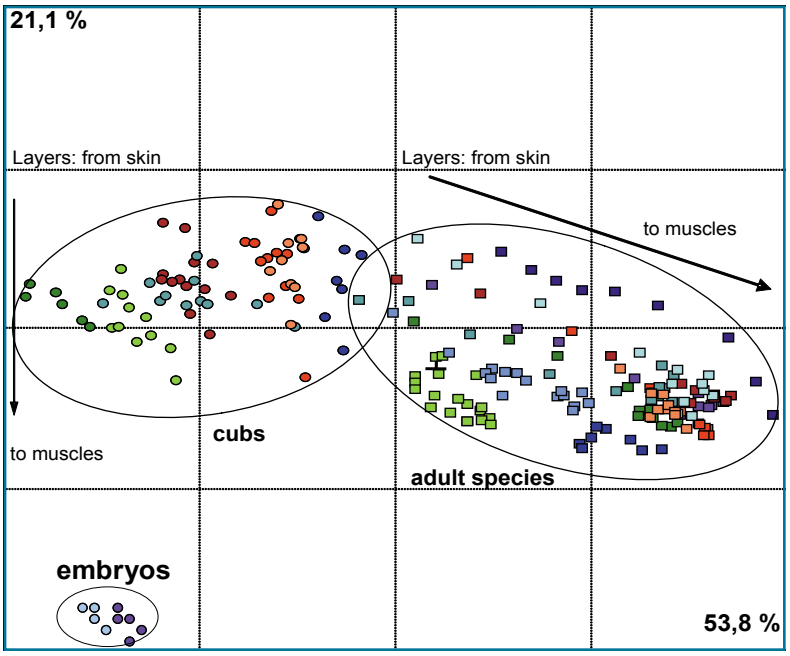
By the method of principal components and building vertical profile of fatty acids it has been revealed that the content of FA is heterogenous in the whole thickness of fat. By the method of electrospray-ionization mass spectrometry has been defined the layerwise composition of molecular types of triacylglycerol (TAG). In the fat of Baikal seal have been revealed about 200 various molecular types TAG, among them defined 37 types of molecules TAG in number more than 0,1 mol.%, fatty-acid composition TAG has been defined.

It has been discovered that molecules TAG with the big number of unsaturated bonds prevail in the upper layers of hypodermic fatty tissue whereas in the inner layers tend to prevail molecules TAG with one-two double bonds.

Clam (Colletopterum ponderosum sedakovi)

Baikal seal

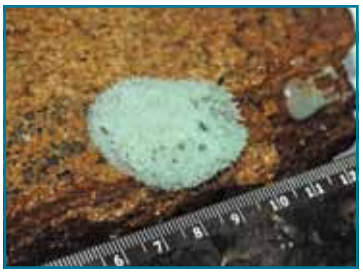
Such distribution of molecules TAG is the result of adaptation to the temperature of external environment. The vertical profiles of fatty acids and TAG in the hypodermic fat of Baikal seals give evidence of various biochemical layers that quantitatively and qualitatively differ from each other and probably represent various functional layers along the whole thickness of fat.



Method of principal components. FA sample distribution of hypodermic fat of Baikal seal of different ages (different colors for different species)

High efficient liquid chromatograph Agilent 1200, with detector of ion trap type ESI-MS Agilent 6330

Sponge Baikalospongia intermedia



Many-coloured sponges in the depths of Baikal

Another interesting object of biochemical research is Baikal sponges. Many deep-water sponges have shades of gray, brown, blue, green colours.

They are associated with the broad spectrum of microorganisms and are the rich sources of biologically active secondary metabolites. The sampling took place in the zone of hydrothermal unloading from the fields of sponges and bacterial mats in the bay Froliha during the international expedition “Miri” on Baikal.

In the lipidic fraction of the researched samples of sponges Baikalospongia intermedia have been discovered and identified the big variety of compounds — about 100 including 64 fatty acids: saturated and unsaturated straight chained and branched of various structures. 17 various aldehydes (6,5-7,3%) have been determined.

The main aldehyde in all researched samples — superlong chained aldehyde 24:1d11a that makes 63.0-69,6% of total content of aldehydes. About 30% sterols (13 sterols of various structures) have also been discovered. The main components of sterols are cholesterol and b-sitosterol. The analysis of lipidic components of samples reveals that some of them can be referred to well defined types or even the types of microorganisms.

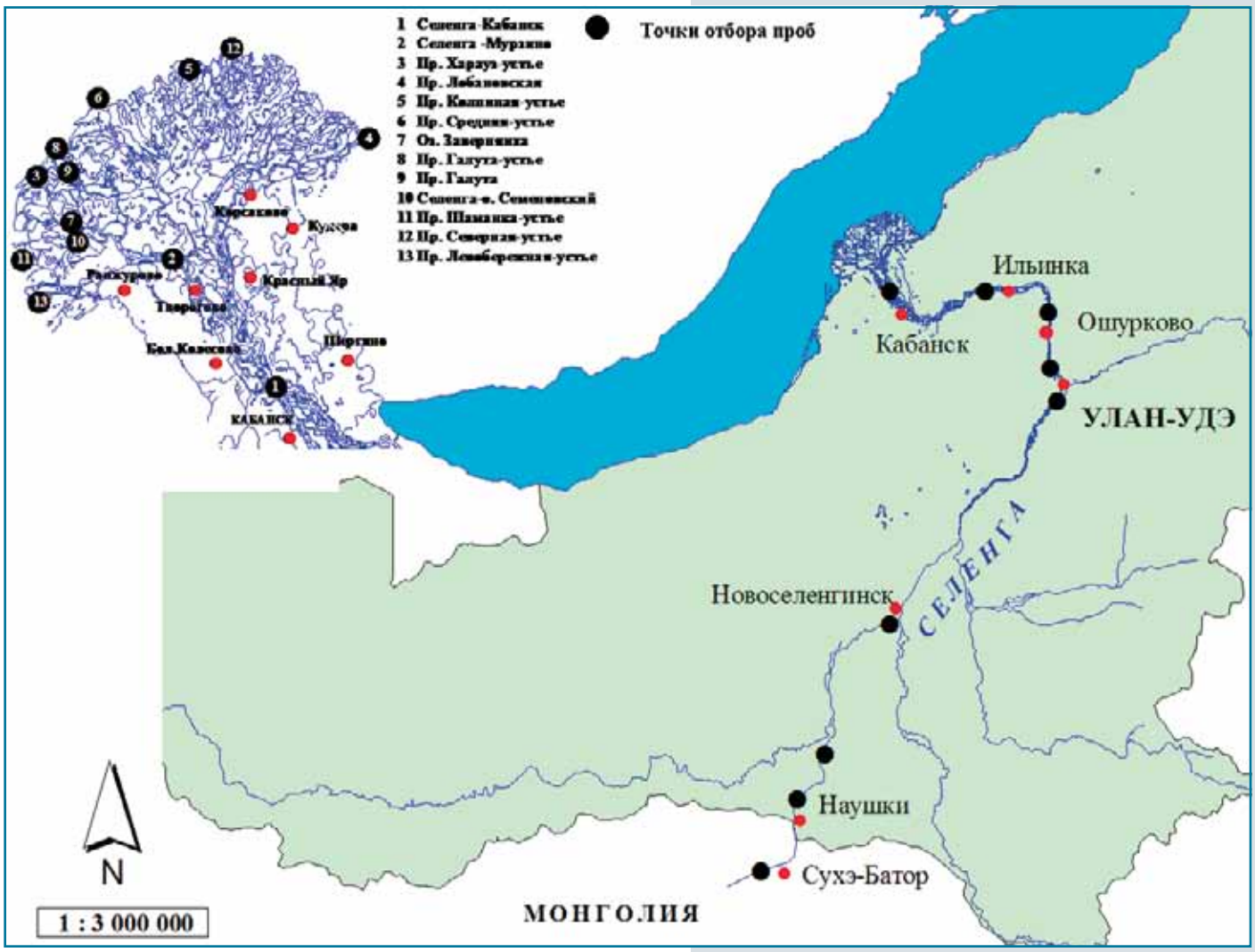
The detection of microorganisms according to lipidic markers makes it possible to determine the contribution of symbionts to overall common pool LC sponges Baikalspongia intermedia. The analysis of microbial community has revealed that the dominant groups are microorganisms referring to groups Cyanobacteria, Antinobacteria, Proteobacteria (alpha-, beta-, gamma-), Firmicutes, Bacteroidetes.

The research staff of the Baikal Institute of Nature Management in cooperation with the Limnological Institute SB RAS for many years has been carrying out the integrated research on different water objects of the Selenga delta that resulted in the reveal of functional characteristics of watercourse and reservoir making up the delta ecosystem in general. The information for data base on seasonal and long-term dynamics of Selenga delta development as a natural biofilter and indicator of present state not only of the River but also Lake Baikal has been obtained.

For the first time the data of content of space distribution and transformation of heavy metals in the system water — suspended matters — bed silt of channels of the Selenga delta have been received.

The seasonal changeability of heavy metal concentration in the water of Selenga and its delta part has been noted. For the first time has been thoroughly studied granulometric and mineral composition of bed silts. The vertical distribution of microelements in alluvial deposits of the delta has been researched.

For the first time the forms of migration of heavy metals have been identified in the bed silts of channels of the Selenga delta. As to the content of heavy metals in bed silts in mobile forms (that is, metathetical, carbonated, ferromanganese oxidated, organic) the metals are arranged in decreasing sequence: Zn>Mn>Cu>Pb>Cr>Fe.



Regular hydrochemical observations on the Selenga River

INTERNATIONAL PARTNERSHIP

In globalization condition there is a growing significance of international partnership. Therefore, the Institute has paid special attention to this issue from the very first years of its activity, even under acute shortage of resources during difficult early 90s. The Programme of sustainable development of the Baikal region undertaken through the American Partnership Agency, is considered its initial practice. Its implementation involves composition of the first land use map of Baikal basin, with its materials published in the USA in Russian and English.

In mid 90s the Institute workers, in co-operation with their colleagues from Mongolia and China, began a research together with the Cambridge University (Great Britain) on the long-term project "Land use culture in Internal Asia". It was the first time the project work included long expeditions and laboratory (cameral) works in Cambridge and science organizations of Mongolia and China. The research results are published in English in two volumes, as well as later in Russian. This partnership has determined the subsequent research area of the Institute and has supported its development during difficult years of its formation.

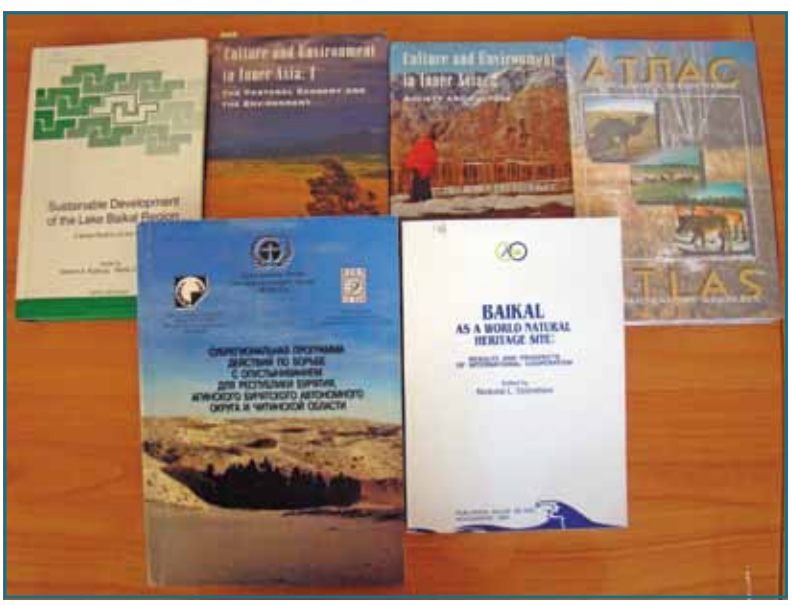
The first international conference "A Man at Baikal" in 1990 has been very useful, as there was participation of scientists from the USA, Great Britain, Germany, Poland, Mongolia and China. Subjects of presentations were much in line with the Programme of the World Summit on sustainable development in Rio-de-Janeiro, which had taken place two years earlier.

Therefore, it is quite logical that on the academician V. A. Koptyug's initiative and under the aegis of NATO Scientific Committee, in 1994 in Ulan-Ude there was held an international conference "Baikal as the world model territory of sustainable development", which assembled greatest foreign specialists of nature management economics. All presentations are published in English by the publishing house "Springer".

It is important to note that decisions of these international activities have laid the conception foundation of federal nature-conservation target programmes and the Russian Federation Law "On preservation of Lake Baikal", they also promoted Lake Baikal to be included in the Register of Places of the World Natural Heritage. In 1998, this tradition was continued by an academician N. L. Dobretsov, the head of the organizing committee of the conference "Baikal as a World Natural Heritage Site: results of international partnership", which was also held in Ulan-Ude.

One of the latest noteworthy international projects was partnership through European Community in technological assistance (TACIS) in the sphere of nature-conservation of the Baikal region. Out of eight projects, the Institute has taken an active part in the following ones: "Promotion of environmental awareness among the population of the Baikal region", "Effectiveness increase of public administration in environmental protection", and "Efficient use of natural resources of the Baikal region".

The final result of these projects was new technique for many scientific and manufacturing enterprises of the Baikal region, training leaders and specialists of all levels in European countries on the subject of modern environmentally safe technologies of timber, mining and agrarian industries. Most of these results are published as workbooks and study papers (monographs).



Main publications on international projects

Results of the project implementation with the Global Environment Facility "Preservation of biodiversity in the Baikal region".

Russian-Chinese field workshop on desertification (June, 2009).

Working session on realization of the Russian-Korean-Mongolian project "Development of integrated model of water resources management of the Selenga River basin" (2009).

Signing of an association agreement between the Institute of geographical sciences and natural resources research of Chinese Academy of Sciences and the Baikal institute of nature management SB RAS (Beijing, 2005)

One of the major achievements of the Institute is the project of the Global Environment Facility "Preservation of biodiversity in the Baikal region", in which dozens of scientific, educational, nature conservation and community-development organizations of the Republic of Buryatia, Irkutsk region and Chita region have taken part.

As a result, environmental activity of local population has substantially grown, large amounts of resources were allotted for realization of natural monuments' preservation activities, school study groups and museums were reinforced, a number of training seminars were conducted, and environment-educating literature was purchased by countryside libraries.

For the first time, there was developed a strategy to preserve biodiversity of the Baikal region, new conservation areas suggested, as well as programmes of ecotourism development which later became the basis for setting up economic recreational areas.

At present, international partnership of the Institute has come from individual grants to systematic long-term co-operation based on contractual relationships with scientific organizations, mainly from Asian countries: Mongolia, China, South Korea, Japan.

The biggest ones are: monitoring research of ecological state of the River Selenga basin and development of integrated model for water resources management, which were carried out in partnership with Water Conservation Committee of South Korea and academic institutes of Mongolian Academy of Sciences. The final results were published by the Korean part as three study books (monographs) in English.

Through TACIS-Tempus project, together with Vienna University Boca (Austria) and Udine University (Italy), for the first time in Russia there was colligated and developed organic farming system based on traditional nomadic animal breeding of nomadic peoples of the Great steppe. Through UNEP Programme there was conducted a research on the steppe agro-landscape changes and on desertification processes of cryoarid territories of Northern Asia.

Starting from 2006, there have been made regular Russian-Chinese complex expeditions to research natural resources and ecosystems along the latitude of 50 degree and longitude of 100 degree North, including Tibet, Mongolian plateau, Baikal, valleys of Lena and Amur Rivers.

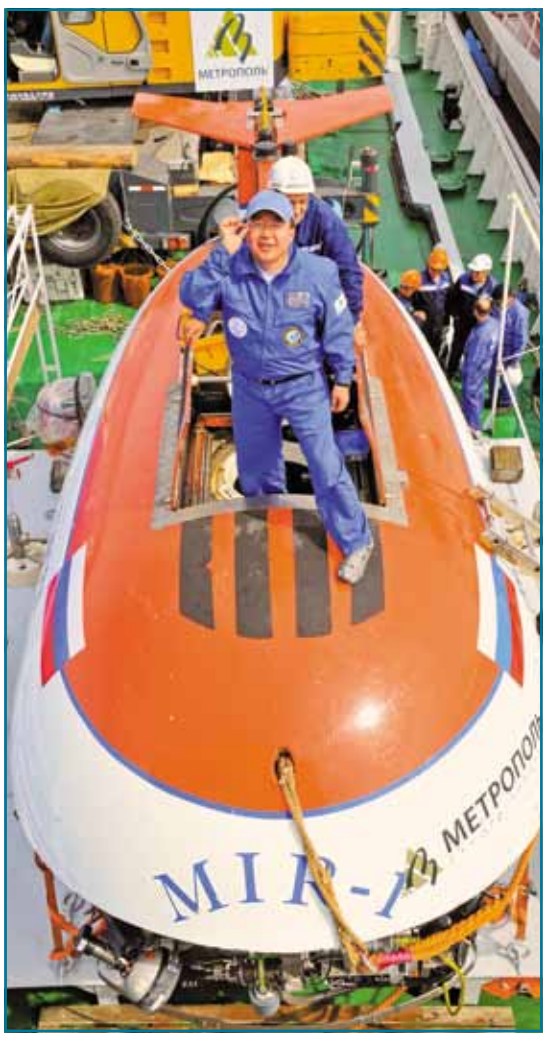
In the sphere of chemical engineering research, in co-operation with Mongolian colleagues, a large amount of work has been done in obtaining fertilizers from phosphorites and oxidized coal in the deposits of the Selenga River basin, including those situated in Mongolia. Special interest in production of medications lies in studying of the chemical composition of xerophitic plants growing in Mongolian steppes.

For the first time, Institute workers have published through the RFBR grant a Russian translation of the book "Biomonitoring of stable organic pollutants" by a prominent Japanese scientist Shinsuki Tanabe. Pollution level assessment of Baikal Lake ecosystem is done in co-operation with Bergen Institute (Norway) through research of comparative fatty-acid composition of Baikal seals and ringed seals.

A big contribution to development of international partnership is done by expedition of deep-water submersibles "Mir" on Lake Baikal, which included scientific conferences, exhibitions, expeditions with foreign scientists. The President of Mongolia Mr. Elbegdorj has submerged to the bottom of Lake Baikal through the Institute's invitation.

In the Institute, special attention is paid to professional development of young scientists through training and academic trips abroad. Most frequent of those are through the following grants: DAAD, INTAS, Matsumae International foundation, the Fulbright Program, the MacArthur Foundation, and the Royal Society, which give access to the leading centres of Germany, Netherlands, Japan, Ireland, USA, South Korea, Austria and Switzerland.

Oil extraction convergence common salt, and mollusks collection in the delta of Hwang Ho River (China) as a fragment of natural economic zoning



Submergence of the President of Mongolia Mr. Elbegdorj on the submersible "Mir" to the bottom of Baikal (2010)

	GEF	TACIS	INTAS	UNEP	DAAD	ICDD	Other	Total
2000	4	1		2	1		3	11
2001	7				1	1	1	10
2002	19	3			2	1		25
2003	1	3			3	1		8
2004					2	1	2	5
2005		1	1		2	1	3	8
2006		1	1		1	1	1	5
2007		1		1	1	1	3	7
2008	1	1		1	1	1	3	8
2009		1		1	2	1	4	9
2010				1	4	1	3	9

Grants from 2000 to 2010

TRAINING AND ACTIVITIES OF YOUNG SCIENTISTS' COUNCIL

The foremost task of the board is training of qualified specialists who have basic interdisciplinary knowledge in the areas of natural and social sciences equally, which are needed in the development of conservation mechanism.

On the basis of the Institute, in co-operation with Buryat State University, there were established departments of geographical and chemical schools and joint laboratories. The workers give lectures and classes on general and special subjects in Siberian Federal University, Chita State University, Irkutsk State University, Russian Economical Academy, East-Siberian State Technological University, and Buryat State Agricultural Academy. There is a special dissertation council DM.212.022.06 for the following specialties: 25.00.36 — Geo-ecology; and 25.00.24 — Economical, social, political and recreational geography.

Postgraduate study allows training in the following specialties:
- 02.00.01 — Inorganic chemistry;
- 02.00.04 — Physical chemistry;
- 02.00.06 — High-molecular compounds;
- 03.02.08 — Ecology (chemical);
- 05.16.02 — Ferrous, nonferrous and rare metallurgy;
- 05.17.01 — Technology of inorganic matters;
- 08.00.05 — National economics and management (in branches and fields, including regional economics, population economics and demography; nature management economics);
- 25.00.24 — Economical, social, political and recreational geography;
- 25.00.36 — Geo-ecology (geographical).

Starting from 1995, the Institute workers have defended 23 doctoral theses, and more than 70 Candidate's dissertations on physical and mathematical, chemical, technical, biological, economical, geographical, pedagogical, pharmacological, historical, and philosophical sciences. Meanwhile, the major part of the defense procedures has been held in the leading scientific institutes of Moscow, Novosibirsk, Krasnoyarsk, and Irkutsk.

For the past five years alone, the Institute has had about twenty important All-Russian and international conferences.

Dozens of highly-qualified workers trained by the Institute have moved to offices in the government, the People's Khural of the Republic of Buryatia, bank organizations, federal authorities; continue researches in scientific organizations of USA, Japan, South Korea, Germany, and Great Britain. Minor Academy of Sciences organized on the initiative of the board has worked in the Republic for more than thirty years; on the basis of International eco-educational centre "Istomino" on Baikal summer schools for senior school students on ecology, economics, chemistry, physics and mathematics are held.

YOUNG SCIENCE
(passport data for 2006–2010)

- Total amount — 72 scientist workers
- Young workers — 47
- Having a scientific degree — 28 (in 2005 — 18), Including
  - scientists — 23
  - Senior staff scientist — 3
  - Scientific officers — 14
  - Junior researchers — 6
- Engineers — 24
- Postgraduates — 36
- Candidate's dissertations defended — 26
- Patents taken out — 21
- Federal and international grants:
  - "Best scientists of RAS" — 6
  - Of the President of Russian Federation — 2
  - FTSP — 4
  - UMNIK — 2
  - DAAD — 11
  - INTAS — 4
  - World Bank scholarship (Japan) — 1
  - Royal Society — 2
  - Japan Foundation, intellectual exchange — 2
  - Prokhorov's grant — 1
  - Matsumae Foundation — 2
- Long-term training abroad:
  Great Britain, Switzerland, Norway, Germany, Austria, Italy, Hungary, Cyprus, USA, China, South Korea, Japan.
- Collective events:
  Seminar-workshops V and VI of young scientists of Russia, Chemist's Day, Ecologist's Day, initiation to postgraduates, Minor Academy of Sciences.

The 30th anniversary of Minor academy of sciences

Defending of the Candidate's dissertations before the special council (December, 2010).

Summer school of ecology in Istomino (September, 2010).

At present, there are 47 workers under 35 years old in the Institute: 28 candidates of science (there were 18 in 2006), 23 scientists out of the latter, 24 engineers, and 36 postgraduates. From 2006 to 2010 only, young workers have defended 26 Candidate's dissertations and have written 2 doctoral theses.

Young scientists and postgraduates for the past five years have received 14 scholarships and foundation awards for scientific achievements: M. V. Mokhosoyev scholarship — 4, contest scholarship "Best scientists of RAS"– 6, World Bank scholarship — 1, "Best scientists of Buryatia" — 3. State support grants to young scientists: from the President of the Russian Federation — 2, RFBR — 14, RFH — 6, international DAAD grants — 11, INTAS — 4, Matsumae Foundation — 2, Royal Society — 2, Max Plank Institute — 1, Fulbright Program — 1. Over 20 young scientists had training in scientific centres abroad through these grants.

For the period of report, young scientists have co-authored and published 174 articles in international and Russian magazines, taken out 21 patents for invention, published 291 articles as materials of international conferences and as parts of study books (monographies).

Starting from 1999, the Institute has organized regular seminars-workshops for young scientists of Russia on the problems of sustainable development, in 2011 the sixth seminar has been conducted. The Institute has carried out over 20 methodological seminars. Activities of the Council of young scientists include many sports events; there was a mountain climb to the peaks of Pribaikalye to celebrate the Institute's anniversary. Sports achievements of young scientists include a title of archery champion of Europe, victories in Russian and international tournaments in freestyle wrestling and chess.

Thank-you letters and certifications of young scientists received during their foreign training

Mountain climb to Cherski Peak (2090 meters) devoted to a 20-year work of BINM SB RAS. Khamar-Daban mountain range (September, 2010).

Training course in the USA through the Fulbright grant by G.G. Mataphonova, Candidate of Biology, Senior staff scientist

5th seminar-workshop of young scientists of Russia. Centre: academician of the RAS M. I. Kuzmin and the Hero of Russia E. S. Chernyaev (June, 2009)

SPORTS LEADERS

Twice Champion of Russia in taekwondo ITF E. A. Kharzheeva

Sports Master Candidate in freestyle wrestling M. S. Dashitsirenova

Sports Master in kettlebell lifting R. A. Nuzhdov

Sports Master of the International Class in archery, Champion of Europe 2010, D.L. Khaludorov

Sports Master Candidate in chess B. Ch. Kholhoev

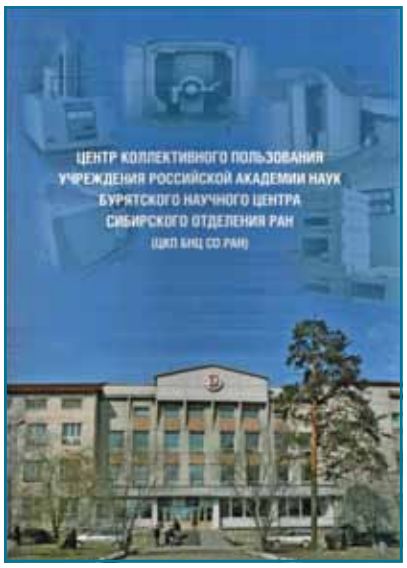
MATERIAL AND TECHNICAL SUPPLIES

The Institute is provided by modern analytical equipment allowing to solve fundamental and applied problems of physicochemical analysis of substances and materials, objects of the surrounding environment of mineral, animal and vegetable origin.

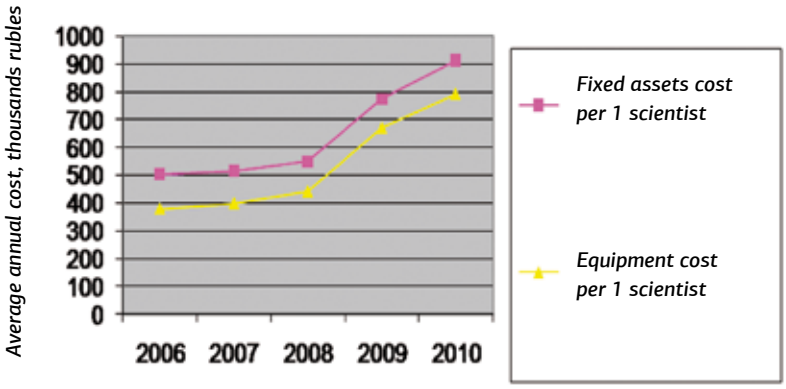
Due to the support of the directorship of the Presidium SB RAS and the Instrumental committee the Institute has purchased for the last five years: infrared Fourier spectrometer, the device of synchronic thermal analysis STA-449 with quadrupole mass-spectrometer QMS, HLC-chromatograph Agilent, thermomechanical analyzer TMA, the system of vapor-phase sample cutting, hydride attachment to AAS and others.

The additional equipping by analytical facilities has been fulfilled on the program of import substitution, grants RFBR and own funds.

The Institute is one of the organizers of the Centre of collective use BINM SB RAS, the constituent part of geographically distributive system of regional centres of collective use of the Siberian Branch RAS.



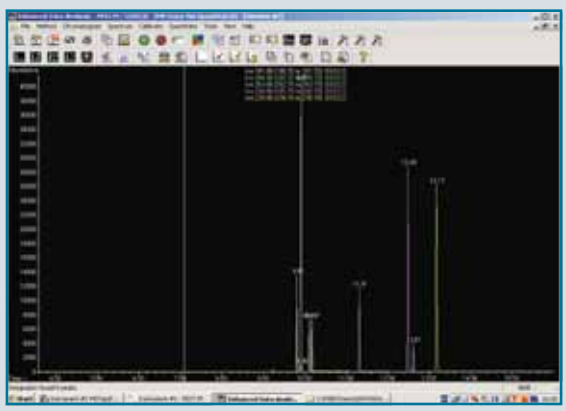
RESOURCE BASE BSC SB RAS FOR 2006-2010



Synchronous thermoanalyser STA 449 C Jupiter

Diffractometer D8 ADVANCE BRUKER AXS

Chromatograpy-mass spectrometric system Agilent 6890N/5973N for identification of complex compounds



INTERNATIONAL ECO-EDUCATIONAL CENTRE "ISTOMINO"

The international eco-educational centre (IEEC) "Istomino" of the Baikal Institute of Nature Management of the Siberian Branch RAS was founded in 2001 in the village of Istomino on Lake Baikal in the Selenga River delta. The main founders are the Siberian Branch of RAS and the Government of the Republic of Buryatia.

The centre represents the complex of buildings, constructions and technical facilities functioning all-year round for fulfilling scientific research of the Selenga delta ecosystem, Lake Baikal and its basin.

During the years of its existence it has hold more than 30 international and All-Russian conferences, 12 summer schools for gifted children. Based on the results of expedition works the monograph "The Selenga River delta — the natural biofilter and indicator of the Lake Baikal condition" (2009) has been published in the series "The integrated projects SB RAS"

IEEC "Istomino" is the only enterprise that provides employment of the local population and becomes the social-cultural centre of the village. The centre supports the activity of the small primary school.

General view

Summer economic school in Istomino

The major tasks of IEEC "Istomino":

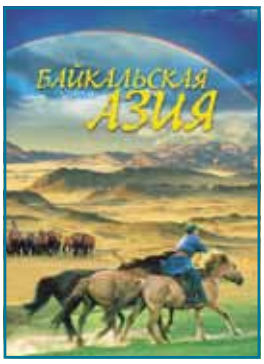
- scientific and material-technical provision for fundamental research of Lake Baikal ecosystem and the Selenga River delta as the indicator of anthropogenic impact and natural change of biodiversity in Lake Baikal basin;
- carrying out scientific expeditions;
- organizing and holding scientific-practical meetings, conferences and activities on the problems of sustainable development of the Baikal region;
- special practical training of the students of natural sciences department and organizing of summer schools for gifted children on Ecology, Economics, Chemistry, Physics and Mathematics;
- developing ecological tourism;
- demonstration of the ecological agriculture system and organic food production with the use of renewable energy.

Visit of academician U. A. Israel (centre, 2005)

Academician V. M. Kotlyakov's lecture (2006)

Field meeting of the Presidium SB RAS and the Presidium of the Academy of Sciences of Mongolia (2010)

Winter drilling on Baikal (2001)



Scientific works on research of Selenginsk Pribaykalye

PRACTICAL RESULTS

Since organization of the Institute, the fundamental researches have been followed by the applied designs, implemented on the task of the government bodies and industrial structures. The first experience has become the integrated programme design on Lake Baikal protection and the rational use of natural resources of its basin affirmed by the Government of Russian Federation in 1994.

On the results of ecological-economic research there have been substantiated increased costs in economics of Buryatia in view of additional nature-conservation measures in Lake Baikal basin. Considering calculations RF Ministry of Finance substantially increased financial assistance to the budget of the Republic of Buryatia (transfers) for the period of 1998-2005.

In 2001 the Institute headed new federal target program design on Lake Baikal protection and rational use of its basin resources, affirmed by RF Government in 2005. During those years materials had been made ready for RF Law "On Lake Baikal protection" and for other federal, regional social-economic and ecological documents.

To applied results refer the scientific substantiation of normative documents for JSC "Buryatzoloto" employees' benefits, working in the mountain and northern conditions of Buryatia; ecological situation assessment of the former site of Dzhida enterprise; creation of Tunka national park; organization of special economic recreational zone "Baikal harbor".

Tourism development issues had been discussed at 4 international conferences held in Buryatia for the last years in co-operation with the Government of the Republic and the federal bodies.

Based on the long-term research there has been designed and implemented at JSC "Buryatzoloto" mining enterprise the high performance system of circulating solutions neutralizaton of hydrometallurgy workshop of gold-containing concentrates processing, providing for cyanide regeneration and return to purified water production with operating costs reduction to 3,2 times.

The Baikal harbor special economic tourism and recreation zone

The neutralization section of JSC "Buryatzoloto" gold-mine "Holbinskiy" hydrometallurgy workshop (performance 500m3/day)

JSC "Buryatzoloto" Holbinskiy mine site view (Buryatia, Eastern Sayans)

In co-operation with the Institute of catalysis SB RAS there have been designed the new silica-alumina nanocomposite catalysts, highly efficient in the neutralization processes of toxic organic components of industrial wastes.

Through intercalation of natural stratified aluminosilicate by aluminum-iron complex there have been obtained stratified columnar-structured sorbents, with developed specific surface and high adsorptive capacity in relation to organic compounds of anion type.

Sorbents and catalysts obtained on the basis of stratified aluminosilicate deposit of the Republic of Buryatia

Almost 20 years the system of adaptive agrarian nature management through renewal of traditional nomadic animal breeding had been developed. It resulted in the creation of commercial herd of high-productive aboriginal animals, adjusted at the most to severe natural conditions of Northern Asian arid steppe in the Baikal region.

There has been granted selection patent by the State commission of Russian Federation on selection testing and protection №3882 for new sheep breeding "Buube". As to the data of Ministry of Agriculture sheep population has reached up to 70 000.

Along with implemented projects the Institute possesses more than 65 invention patents, utility models and selection achievements for further development in real sector of economy. In conformity with the Federal Law of 2 August 2009 №217-FL "Change proposals to separate legislative acts of Russian Federation on economic associations formation questions by budget scientific and educational institutions for practical realization (implementation) of intellectual activity results" the Institute established minor innovative enterprise (MIE) for practical realization of their intellectual property.

The Institute's projects stand at third Chinese-Russian science and technology exhibition


ПАТЕНТ
НА СЕЛЕКЦИОННОЕ ДОСТИЖЕНИЕ
№ 3882
Овцы
БУУБЭЙ

Buube breeding patent

Certificate of honor of contribution to aboriginal buryat-mongolian sheep genofond renewal

Perspective innovative projects of the Institute:

- new types of cheap cement enabling to replace Portland clinker's part for magnesium-silicate or dolomite rock in deposits of Buryatia;
- antifriction composite material for packing elements and sliding bearing that enable considerably increase safety and operating abilities of modern tribounits;
- technologies of molybden, tungsten and rhenium obtaining from low-quality industrial products; technologies of obtaining marketable products from various raw materials, domestic and industrial wastes;
- functional food and bioactive additives from seeds, cones, conifer branches, cedar pine of Eastern Siberia and Far East; modern ways of obtaining fertilizers from oxidated brown coal in Zabaikalie and Mongolia.

There have been searches of bioactive substances of natural regenerated raw material growing in the territory of Buryatia and Mongolia, for creating new high efficiency drugs and their forms. The chemical composition of raw material collected has been researched, bioactive compounds have been defined.

Based on fat of Baikal hydrocoles, Siberian marmot and cedarwood oil, unsaturated fatty acids concentrates there have been synthesized new surface-active compounds and medicine copolymers and there have been designed liposome nanostructured drug carriers.

The Institute at all authority levels sequentially promote economic development of the Baikal region, nature-conservation problems solutions considering local population's interests and, first of all, living standard rise.

The key problem of Baikal natural territory ecology is magistral gasification of Zabaikalie and Mongolia that can substantially decrease atmospheric air pollution in the Central environmental zone of the Baikal region and Ulaanbaatar.

One of the most actual problems is ammunition dump utilization located in Ulan-Ude and near other settlements of Siberia. In co-operation with investors there have been suggested mobile technology of ammunition use for household rubbish burn with heat and energy obtained.

Bioactive additives and food obtained from seeds, cones, conifer branches and cedar pine bark

There have been suggested amendments to current legislation enabling to enlarge the list of permitted economic activities in the central environmental zone. Our designed projects correct JSC "Irkutskenergo" activity that generates electricity in the interval not exceeding Lake Baikal level from 456 to 457 m, enabling to conserve shallow water ecosystem bioproductivity.

The officials of the country have received the documents proving impossibility of existing Baikal pulp and paper plant with the plans of sustained environmental economical development of Prybaikalye.

Binding and heavy concretes (RF patent №№2320592, 2372306, 2393129)

Non-metal composite antifriction materials (RF patents №№2378413, 2389585, 2402640)

ENVIRONMENTAL EDUCATION AND COMMUNITY-DEVELOPMENT ORGANIZATIONS

LAKE BAIKAL PROTECTION FUND

Presentation of "Mirs" on Baikal expedition (Moscow, RIA Novosti, 2008).

Meeting in Ulan-Ude dedicated to the beginning of "Mirs" on Baikal expedition" (2008).

Days of Baikal in Gremyachinsk village (2008)

One of the main factors in solution of nature conservation problems in modern society is development of environmental culture. Therefore, our Institute, being one of a few educational organizations, makes the tasks of environmental education the target of its research and practical realization. For that purpose, the Institute has developed and been gradually implementing the system of environmental education of different social groups of the Baikal region population.

It consists of a series of activities, including publication of educational literature and visual aids for preschoolers, university students, personnel retraining. As an example, you can name the publication of environmentally-educating magazines for children "Verges of Baikal", "Ushkan", production of a table game "Who will get to Baikal first?" There is a course of studies and a textbook for students "Basics of ecology and nature conservation" with a series of educational ecological-geographical maps of the Republic of Buryatia attached.

For general readers, starting from 2004 there is a subscription to a popular science illustrated ecology-based magazine "World of Baikal". There have been published over 30 issues from that time on, with publications on Baikal news, essays about conservation areas, information about the "Red Book" plants and animals, facts of poaching, nature-conservative measures.

We pay special attention to promotion of scientific achievements, information on the role of science in solution of Baikal problems, co-operation with federal and local authority.

The work of the Buryat regional department of Russian Geographical Society under the Institute involves environmental education of the population. For the purpose, through the National library of the Republic of Buryatia, there is a geographical lecture centre "My planet", publication of a series of wall maps for schools "Fellow countrymen", printing of a banner "Baikal is a site of the World nature heritage". Schools and libraries received textbooks, reference books and geographical maps.

A popular science ecology-based magazine "World of Baikal"

The Institute is one of active participants of Lake Baikal protection fund (LBPF), which organized an expedition of deep-water submersibles "Mir" on Baikal. With its financial support there is work on publications of environmentally educating literature and exhibitions.

The Institute initiated a draft law "About environmental education and formation of environmental culture of the Republic of Buryatia population", which was submitted to the People's Khural of the Republic of Buryatia.

Baikal delegation meeting N. N. Drozdov at the XIV convention of the Russian Geographical Society (December, 2010)

Summer schools at Istomino

BIG SCIENTIFIC CONFERENCES

In planned economy situation, every 5 years there were big staff meetings regarding development of productive forces. The results of fulfillment of the CC CPSU and the Council of Ministers of the USSR's regulations on "Baikal problem" were regularly discussed at the meeting of party officials and senior executives.

The Institute has kept this tradition, and its first similar conference "Man at Baikal and his environment", which took place in 1990, rose conceptual questions of sustainable development of society.

In 1994, on academician V. A. Koptyug's initiative and under the aegis of NATO Scientific Committee there was held an international conference "Baikal as the world model territory of sustainable development".

Later the Institute came forth with suggestions of conducting regular conferences on results of "Baikal" regulations' realization, as part of Baikal forum, which was initially planned to be conducted in three regions of Baikal natural territory.

Problems of today are still the questions of discussing social and economic developmental problems of Siberian regions, of finding mutual interests in globalization conditions, which is the main theme of scientific activities conducted by the Institute on Russian and international levels.

2006
- International scientific conference "Transboundary aspects of natural-resource potential of the Selenga River basin in new social-economic and geopolitical situation".
- Russian-Korean-Mongolian seminar on the project "Integrated model of river basin management for the Selenga River basin".

2007
- International scientific — practical conference "Sustainable tourism development: experience and innovations".
- All-Russian scientific conference with international participation, devoted to the 75th birthday of the corresponding member AS USSR M.V. Mokhosoyev.
- International scientific-production seminar "To organic agriculture through education" within the project TEMPUS "Organic farming in Zabaikalye".
- International expedition on the project "Integrated model of water resources management in the Selenga River basin".

2008
- International scientific-practical conference "Modern problems of rational use and protection of transboundary waters".
- International conference "Selenga without boundaries".
- IV international seminar on the project "Integrated model of water resources management in the Selenga River basin".
- International conference "Priorities and development features of the Baikal region".
- International training seminar within ecological education for administration organization employees.
- All-Russian conference on macromolecular chemistry.

2009

- International conference “Biodiversity conservation mechanisms in the Baikal region” within the framework of “Living Lakes” — 10 years partnership on Baikal: providing of man sustainable future”.
- International seminar-meeting “Problems of Central Asia desertification”.
- International conference “Role of science in sustainable development of the Northern Asia”.

2010

- International scientific-practical conference “Baikal region priorities in Asian geopolitics of Russia”.
- V International conference “Theory and practice of ecological insurance: results and prospects”.
- International conference “Euroasia deltas: origin, evolution, ecology and economic development”.

III International scientific-practical conference “Sustainable tourism development: strategic initiatives and partnership” (2009)

International scientific-practical conference “Priorities of Baikal region in Asian geopolitics of Russia” (2010).

AWARDS, TITLES AND REWARDS

ORDERS, MEDALS AND TITLES OF THE RUSSIAN FEDERATION:

- Order of Honour — 1
- Medal of the Order of Merit for the Motherland, 2nd degree — 1
- Order of the Polar Star (Mongolia) — 1
- Letter of Commendation of the Council of Federation of Russia — 1
- Letter of Commendation of the State Duma of Russia — 1
- Honoured Scientist of Russia — 4
- Honoured Economist of Russia — 1

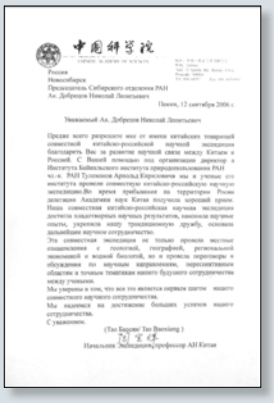
AWARDS AND HONOURS OF THE REPUBLIC OF BURYATIA:

- Honoured Scientist of the Republic of Buryatia — 12
- Honoured Economist of the Republic of Buryatia — 3
- Letter of Commendation of the Republic of Buryatia — 3
- Letter of Commendation of the Government of the Republic of Buryatia — 3
- Science Award of the Republic of Buryatia — 1
- Letter of Commendation of People's Khural of the Republic of Buryatia — 11

DEPARTMENTAL AWARDS:

- Letter of Commendation of the RAS and Union of RAS — 21
- Letter of Commendation of the SB RAS — 41
- Best Scientists of RAS — 9
- The Russian Geographic Society Award — 2
- Deputies of the People's Khural of the Republic of Buryatia — 2

Investiture of the Order of the Polar Star in Mongolia (2010)



Thank-you letters, awards

SCIENTIFIC EFFICIENCY RATING OF THE INSTITUTES RAS

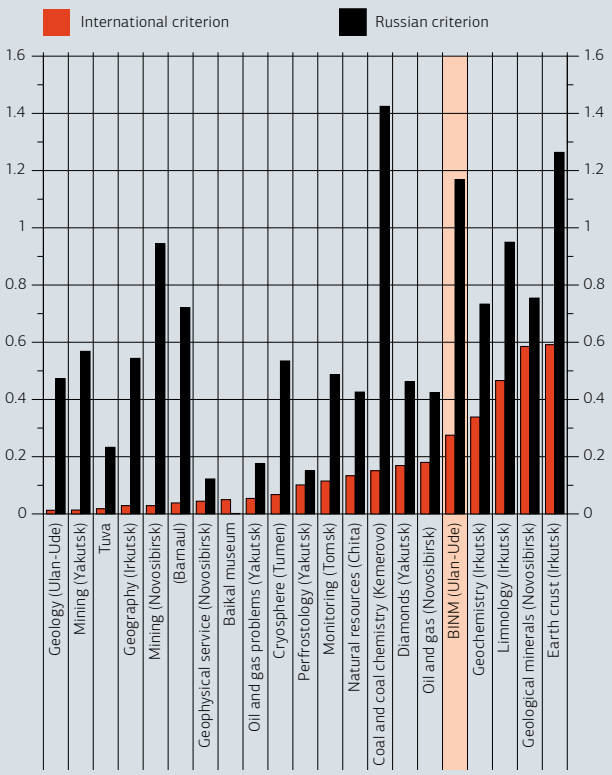
Modern demands of activity efficiency of scientific establishments create new mechanisms of rating system. These are indicators as scientific citation index (RISC), Web of Science (WOS) and others determined by independent experts.

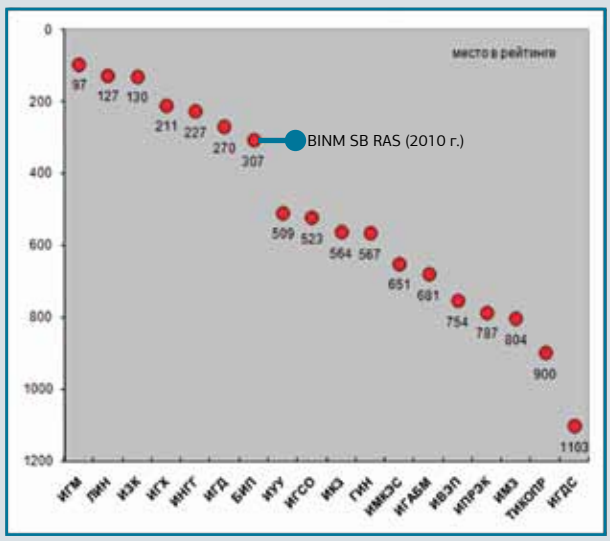
These indicators reveal, first of all, the number of publications in the leading academic magazines and foreign publications. The Institute takes the leading position among profiled and leading research institutes of the Siberian Branch of the RAS.

But these rates do not include the basic principle as financial costs per unit of scientific production. Taking into account such approach the Institute, with minimal budget for maintenance (absence of its own building and limited staff), would improve its position among the institutes of the Russian Academy of sciences.

	Indicators for 2005-2009 years				
	Rating of Russian SRO	Total number of publications	Number of publications in magazines with IF>0	Number of quotations in RISC + SCOPUS	Average IF of magazines with articles published
ИГМ	97	710	565 (79.6%)	764	0,85
ЛИН	127	402	371 (92,3%)	402	0.47
ИЗК	130	526	479(91.1%)	352	0,40
ИГХ	211	298	267 (89.6%)	218	0.40
ИНГГ	227	380	371 (97.6%)	188	0.43
ИГД	270	506	494 (97.6%)	148	0.21
БИП	307	357	342 (95.8%)	139	0.27
ИУУ	509	307	288 (93.8%)	69	0.16
ИГСО	523	221	192(86.9%)	92	0.15
ИКЗ	564	102	101 (99.0%)	75	0.39
ГИН	567	9S	94 (95.9%)	67	0.34
ИМКЭС	651	172	145(84.3%)	49	0.24
ИГАБМ	681	132	131 (99.2%)	58	0.22
ИВЭП	754	243	218(89.7%)	34	0.11
ИПРЭК	787	94	80 (85.1%)	45	0.20
ИМЗ	804	57	55 (96.5%)	31	0.52
ТИКОПР	900	56	54 (96.4%)	19	0.22
ИГДС	1103	115	115(100%)	11	0.07
ИПНГ	1200	35	32(91,4%)	1	0.19
ГС	1200	10	10(100%)	3	0,61

EARTH SCIENCES. AVERAGE NUMBER OF PUBLICATIONS A YEAR PER ONE SCIENTIFIC WORKER FOR PERIOD 2005-2009





Institutes USC of Earth sciences SB RAS in Russian scientific-research organizations rating (more than 1500)

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Photos taken from BINM SB RAS archive

Design by N.V. Ushakov

Publishing house "ECOS"
23, str. Kalandarishvili, Ulan-Ude, Republic of Buryatia
E-mail: *bpress@aif.burnet.ru*

Run of 300 copies

Printed by **"Domino" press.**
54a, str. Smolina, Ulan-Ude, Republic of Buryatia