WORLD HERITAGE NOMINATION - IUCN SUMMARY

LAKE BAIKAL BASIN (RUSSIA)

Summary prepared by IUCN/WCMC (March 1996) based on the original nomination submitted by the Government of the Russian Federation. This original and all documents presented in support of this nomination will de available for consultation at the meetings of the Bureau and the Committee.

1. LOCATION

Situated in south-east Siberia in the Russian Federation, and covering parts three administrative regions, namely the Republic of Buryatia and the Irkutsk and Chita Oblasts.

2. JURIDICAL DATA

The nominated property includes five national parks and nature reserves amounting to 1.9 mil ha. plus the Lake Baikal (3.15 mil. ha), plus other regional parks and lands in the core coastal protection zone. Total size is 8.8 mil. ha. Protected areas at the federal level are under authority of the Ministry of Environmental Protection and Nature Resources, and the Federal Forestry Service. The Government of the Russian Federation is responsible for administration in the Lake Baikal basin,via the Government of the Republic of Buryatia, and the local administration in the Irkutsk and Chita Oblasts. A federal government programme entitled the Lake Baikal Protection and Rational Use of Basin Natural Resources was approved in 1994.

3. IDENTIFICATION

The nominated property includes Lake Baikal itself, the deepest in world and containing 20% of all fresh running water on the planet, that part of its catchment basin located within the Russian Federation, the river-head of the Angara River and the Irkutsk water reservoir. The basin support a variety of plant and animal species, a number being endemic; the most notable animal is the endemic Baikal seal, a uniquely freshwater species in what is otherwise a marine mammal. The great variety of the plants in the basin is determined by its climatic asymmetry: the western part of the basin is occupied by light coniferous forests and mountain steppes; in the eastern part pine forests predominate; and in the north it is covered by deciduous forests. The formation of the geological structures in the basin took place during the Palaeozoic, Mesozoic and Cenozoic periods and there are a number of significant geological features.

4. STATE OF PRESERVATION/CONSERVATION

There are a number of environmental threats including sedimentation, thermal pollution and changes in hydrological flow as a result of the regulation of the Angara River. The Basin has a population of some 2.5 million people and there are many cities, villages and industrial enterprises in the buffer zone surrounding the core area. As a consequence there is a risk of sewage and agricultural run-off and industrial dumping. Nevertheless, the Lake is at present in essentially good condition.

5. JUSTIFICATION FOR INCLUSION ON THE WORLD HERITAGE LIST

The Government of the Russian Federation has presented the following justification for designation as a World Heritage natural property:

(i) **Contains examples of the major stages of earth's history and outstanding geological features**. Lake Baikal and adjacent areas belong to the rift zone which has developed since the Mesozoic period.

(ii) **Contains examples of on-going ecological and biological processes**. Lake Baikal is geologically dynamic and continues to grow by approximately 1.5cm a year. There is an exceptional level of species endemism.

(iii) **Contains superlative natural phenomena and areas of exceptional natural beauty and aesthetic importance**. Both the wider Basin and the Lake itself is distinguished as a landscape of outstanding natural beauty.

(iv) **Contains the most important and significant natural habitats for threatened species**. The flora and fauna of the Lake Baikal basin are represented by a great variety of species typical for mountain forests, steppes and tundra.

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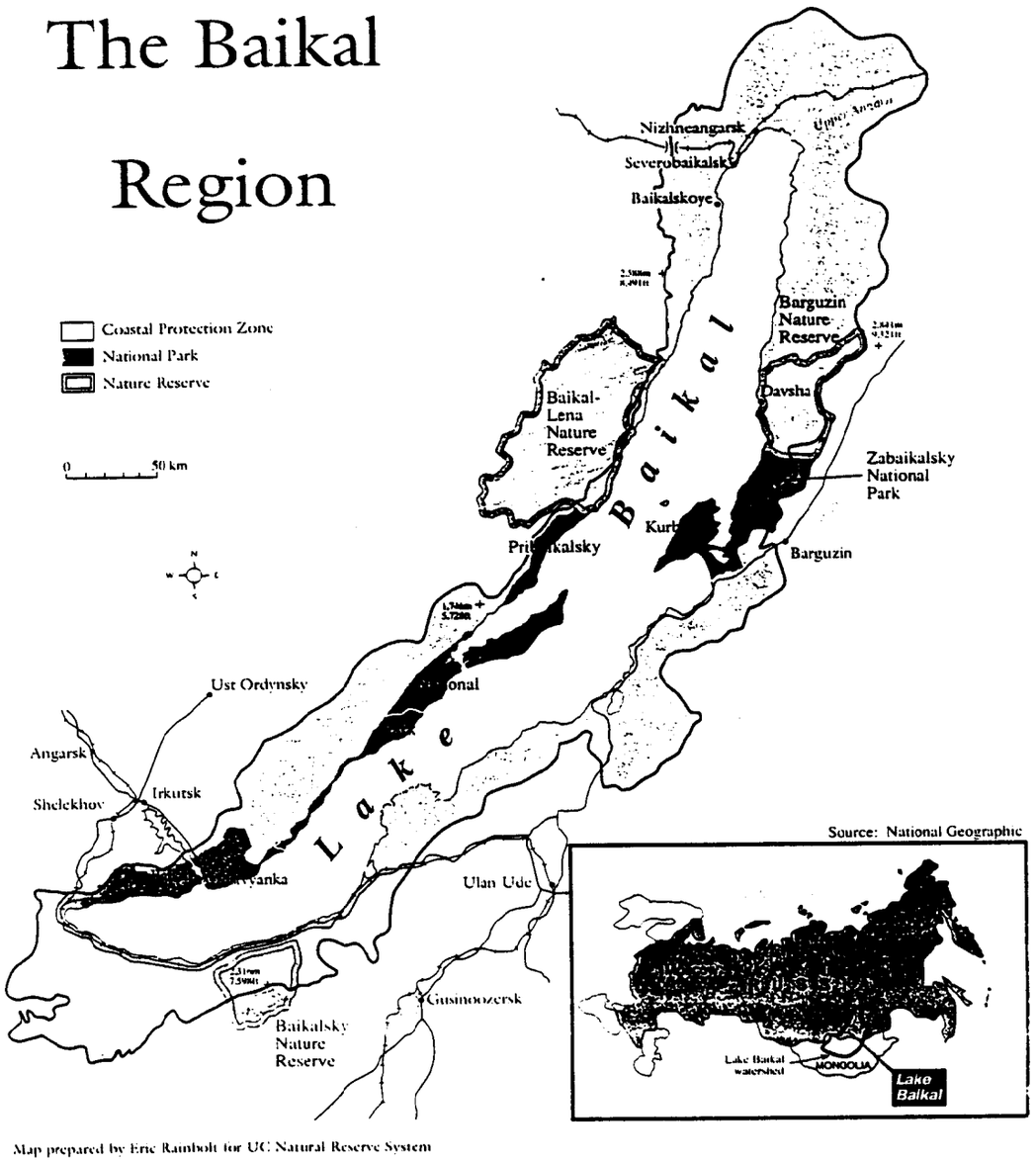
The Baikal Region



Map prepared by Eric Rambolt for UC Natural Reserve System

Shaded area represents the approximate boundary of the World Heritage Site.
A more detailed 1:1.25 mil. topographic map showing the exact boundaries is available.

WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

LAKE BAIKAL BASIN (RUSSIA)

1. DOCUMENTATION

(i.) IUCN / WCMC Data Sheet (6 references)

(ii.) Additional Literature Consulted: Boyle, T. et. Al. 1990. Report of the Fact-finding mission UNESCO to Irkutsk and Lake Baikal Concerning Inclusion of Lake Baikal and its Watershed in the World Heritage List; Krever, V. et.al. eds. 1994. Conserving Russia's Biological Diversity: An Analytical Framework and Initial Investment Portfolio. WWF; Cherrington, M. 1991. Siberia's Sacred Sea. **Wildlife Conservation**. September; Shestakov, A. 1995. Lake Baikal: A Threatened Jewel. **People & the Planet** 4(2); Ananicheva, M.D. et.al. 1995. Sacred Sites on Siberia's Lake Baikal. **Site Saver News**; Rodgers, A. 1990. **The Soviet Far East**. Routledge; Berg, L-S. 1950. **Natural Regions of the USSR**. Macmillan; Pryde, P. 1991. **Environmental Management in the Soviet Union**. CUP; Matthiessen, P. 1992. **Baikal-Sacred Sea of Siberia**. Sierra Club; Lydalph, P. 1977. **Geography of the USSR**. Wiley; Grachev, M. 1994. Formation of the Baikal International Centre for Ecological Research. **Ecological International Bulletin**. 21. IUCN. 1990. Back from the Brink: A Case Study of Lake Baikal; Kira, T. ed. 1995. **Data Book of World Lake Environments**. UNEP; Ando, M. ed. 1995. **Directory of Water Related International Cooperation**. International Lake Environment Committee Foundation; Belt, D. 1992. The World's Great Lake. **National Geographic**. 181 (6); Centre for Citizen Initiatives. Et.al. 1993. The Baikal Region in the 21st Century: A Model of Sustainable Development or Continued Degradation? 176p.; Environmental Resources Management. 1995. Ecotourism Masterplan and Development Plan for Lake Baikal. 2 volumes; Flower, R.J. et. Al. 1995. Sedimentary Records of Recent Environmental Change in Lake Baikal. **Holocene** (5).

(iii.) Consultations: 8 external reviewers, Russian Government officials, Buryatia and Irkutsk local Government officials, Limnological Institute staff, Baikal Environment Wave, Baikal Centre for Ecological and Citizen Initiatives.

(iv.) Field visit: Jim Thorsell, Zbig Karpowicz, June 1996

2. COMPARISON WITH OTHER AREAS

Lake Baikal (LB) is so distinctive that it merits a separate Biogeographic Province. It is, of course, one of many millions of natural freshwater lakes around the world but is one of the world's major lakes in terms of size and volume. As the attached tables demonstrate, it is the sixth largest in the world in terms of surface area but the largest in terms of volume of freshwater. It is also the oldest (25 million years) and deepest (1700 m) of the world's lakes (The age of most other lakes on earth rarely exceed 30,000 years.). It is also one of the world's most biologically diverse lakes with

LAKES OF THE WORLD: STATISTICAL COMPARISONS

Volume of selected lakes and reservoirs

	Volume (km^3)
Natural lakes	
Baikal (Russia)	23,000
Tanganyika (Tanzania/Zaire/ Burundi/Zambia)	17,800
Superior (Canada/USA))	12,221
Nyasa/Malawi (Malawi/Tanzania)	8,400
Michigan (USA)	4,871
Victoria (Kenya/Uganda/Tanzania)	2,750
Great Bear (Canada)	2,236
Ontario (Canada/USA)	1,638
Toba (Indonesia)	1,258
Leman (Switzerland/France)	89
Reservoirs	
Owen Falls (Uganda)	204
Bratsk (Russia)	169
Aswan High Dam (Egypt/Sudan)	169
Kariba (Zimbabwe/Zambia)	160

Mean Residence time* of selected lakes/reservoirs

	Residence time (year)
Natural lakes	
Titicaca (Peru/Bolivia)	1,343
Tahoe (USA)	700
Baikal (Russia)	380
Superior (Canada/USA)	191
Great Bear (Canada)	124
Michigan (USA)	99.1
Vattern (Sweden)	55.9
Victoria (Kenya/Uganda/Tanzania)	23
Biwa (Japan)	5.5
Balaton (Hungary)	2
Tai-hu (China)	0.65
Reservoirs	
Kariba (Zimbawe/Zambia)	3
Volta (Ghana)	4.3

(*mean water volume/mean annual flux of outflowing water

Surface area of selected freshwater and salt lakes	(km^2)
Freshwater lakes	
Superior (Canada/USA)	82,367
Victoria (Kaney/Uganda/Tanzania)	68,800
Ontario (Canada/USA)	59,570
Michigan(USA)	58,016
Tanganyika Tanzania/Zaire/Burundi/Zambia)	32,000
Baikal (Russia)	31,500
Great Bear (Canada)	31,153
Erie (Canada/USA)	25,821
Leman (Switzerland/France)	584
Salt lakes	
Caspian Sea (Russia/Iran/Turkmenistan/ Kazakhstan/Azerbaidjan)	374,000
Aral Sea (Kazakhstan/Uzbekistan)	64,500*
Balkhash (Kazakhstan)	17,301
Maracaibo (Venezuela)	13,010
Dead Sea (Israel/Jordan)	940

*before shrinking

Fish species in old lakes

Lake (Area)	Lake age (million years)	Number of fish species	Ratio of endemic species
Tanganyika (Africa)	5 - 20	>250	>80%
Victoria (Africa)	0.75	>240	>80%
Malawi (Africa)	2	>260	>80%
Baikal (Asia)	20-30	40*	50%*
Biwa (Asia)	2	60*	20%*

*approximate value

Source: Kira (1995)

1500 species of aquatic organisms living in the Lake, 80% of them endemic. It has, however, far fewer fish species (40) than the old large lakes in Africa such as Tanganyika (250). The waters of LB are also particularly rich in shrimp-like amphipod species (255 species) and flatworms (80 species). (An average lake in Europe would have 3 species of amphipods and 8 flatworm species.) The richness of the freshwater shrimp fauna here (one-third of the world's total and all but one genus endemic) is of special interest to evolutionary scientists. A related unique feature of LB is the purity of its water which is maintained by one of these endemic zooplankton (Epischura).

Its limnology is also different with a mineral content 25-50% lower than of most other freshwater lakes. The unusual purity of water is also due to the fact that most of LB's watershed is surfaced with rock so that the water inflow into the lake has little chemical or mineral contact and the water is thus very transparent. Unlike the water that is found in Lakes in warm climates., the water in LB mixes thoroughly, carrying columns of biologically productive cold water that is laden with oxygen from the surface to the bottom. Species thrive in this cold water and also in the steam that escapes from hydrothermal vents located along fault lines at the bottom of the seismically-active lake.

LB is also meteorologically distinctive too in that it is further removed from oceans than other large freshwater lakes and has an extreme continental climate with temperatures ranging almost 100° C over the course of a year. It is also large enough to create its own microclimate, moderating temperatures within a 25 km radius from its shores.

In conclusion, so much about LB is different from anywhere else on earth that it has attracted widespread scientific attention as well as calls for its preservation. It has been referred to as the "Galapagos of Russia" as its age and isolation have produced one of the world's richest and most unusual freshwater faunas. Along with the equally interesting features of Lake Tanganyika which only has one small protected area and the Lake Malawi World Heritage site (9400 ha), LB would be the single-most remarkable freshwater lake on the planet.

While the biology of LB itself is unique, the biology of its surroundings is ordinary. The animals and plants are typical of the boreal forest zone although ten IUCN Red Data book animal species occur. LB also lies close to where the Siberian taiga meets the Mongolian steppes and there is thus some intermixture of the two elements (e.g. occurrence of steppe on Olkhon Island). The fact that LB is set in magnificent protected taiga-clad mountain scenery is a major added bonus and one key to its integrity.

Finally, due to the intrinsic values of LB as briefly outlined, the region has generated an exceptional amount of research with over 10,000 references identified on the Limnological Institute's data-base. Some 40 international scientific expeditions visit LB in an average year which is a strong indicator of its importance to science.

3. INTEGRITY

As in many frontier regions of the world, large-scale extraction of resources and accompanying industrial development began in the LB region following the post-second world war period. Intensified agriculture, timber harvesting, railroad and reservoir construction, and increased fishing in the lake began to take their toll. The first major conservation issue in the former Soviet Union began at Baikal in 1966 when a large pulp and paper mill was built on the shore of the lake amidst unprecedented public concern. Conservation activities were then initiated including special ministerial decrees and the establishment of additional protected areas around the lake. Even with its abundant water, forests, fish and wildlife resources, LB nevertheless began to show signs of decline.

The uses of and threats to LB have been the subject of much debate and numerous studies as cited in 1(ii) above. The nomination only briefly mentions the threats and for the purposes of this evaluation these are summarised below.

The state of conservation over most of LB is good. There is an extensive system of nature reserves and national parks surrounding most of the lake extending up to the adjacent mountains. Due to the great assimilative capacity of LB, the recuperative powers of the terrestrial environment and the vast area of protected land around the lake, the environment is still largely intact. However, air, water, and soil pollutants and associated visual impacts are severe in certain localities. There are 40 towns surrounding LB and some 2 million people live in its 600,000 km² drainage basin. There are two major industrial complexes on the shore of the lake itself - a pulp and paper mill at Baikalsky and the railway centre at Severobaikalsk. Pollutant loads from as far away as Ulan Bator in Mongolia are brought into the lake via the Selenga River. The point sources and pollution loads for most of this water and air pollution have been well documented and many reports and plans completed outline the actions required.

There are also other concerns relating to the extent of forestry and over-fishing. Tourism is growing and a plan to manage it has been prepared. The existing protected areas suffer from a serious lack of resources for management (cutbacks of 75% over the past five years of economic transition have been experienced) but this will be somewhat relieved with assistance under a GEF project.

In response to the growing need to better manage and protect Lake Baikal in anticipation of its World Heritage nomination, the national and regional governments in Russia have put into effect a number of conservation measures. Several of the key ones include:

- As the greatest pollution source for LB is the pulp and paper plant at Baikalsky, the authorities have agreed to convert the mill to other uses. This activity will cost more than US$ 100 million and will cause local economic disruption in the short term. The closure of the existing inefficient mill and the cessation of the cellulose bleaching that has had such severe effects on the south end of LB is, however, essential., The details and the timetable for this phase-out are still under discussion and the World Heritage Committee will wish to very strongly encourage the authorities to proceed with the conversion as quickly as possible.

- In 1990 a second pulp and paper complex at Selenginsk was re-tooled and now operates on a closed cycle system with no dumping of waste into the lake. This initiative demonstrates that conversion of these facilities is possible as well as the commitment by the authorities to reducing the pollution loads in the lake.

- LB's second major pollution source is the Selenga River and over 100 waste water treatment plants have been installed over the past decade. There still remains, however, significant pollution from agricultural, industrial and municipal sources upstream and further improvements are needed.

- The third area where pollution loads are high is around the city of Severobaikalsk on the north end of LB. Water quality here is being monitored but plans for reducing the growing impacts here are not yet firm.

- Tree felling in the shore zone of LB was prohibited in 1986 as was the harmful practice of log transport on the lake. There is still heavy exploitation of forests in the region outside of the core zone of the lake and information on the impacts of this are addressed in the 1993 Baikal regional plan.

- A major policy document entitled "Comprehensive Federal Programme for the Protection of LB and Rational Use of its Natural Resources" was approved by the Russian Government in November

1994. This provides an overall policy document for LB and its region and provides a strong basis for its conservation.

- A "Baikal Commission" was established in 1993 and is the key administrative body co-ordinating the efforts of the senior authorities of the Federal and three regional governments as well as scientific experts and NGOs. A Secretariat for this Commission is in the process of being established.

- A further project to develop a regional land use plan for the LB region was completed in 1993. Although not officially adopted, this 176 page report has acted to provide the stimulus for strengthening land use policies in the regional context (including that portion of the drainage basin in Mongolia).

- In addition to these policy frameworks and administrative structures, the legal basis for management of LB is provided in a new Federal Law on the Protection of LB. This law has passed first reading in the Russian Duma and is expected to be passed in the near future. An English version of this Law (April, 1995), which has the support of the regional governments, has been reviewed by IUCN and fully endorsed as a solid basis for supporting conservation of LB and its region. Among other things, the Law defines three zones: a central core zone of the lake and the land and protected areas next to it, a buffer zone including most of the drainage basin and an atmospheric impact zone.

- It is also noted that in addition to this Federal Law there are also many strong laws and regulations at the level of the local governments that, if fully applied, also form strong measures for ensuring the integrity of LB.

- Apart from the above activities of government agencies to protect LB there is a substantial contribution also being made by conservation NGO's based in Russia.

In conclusion, IUCN's overview of the many pressures on the integrity of the lake and the measures being undertaken to address them is one of cautious optimism. There is no doubt that a number of negative impacts on LB have been experienced and there are serious problems remaining. Implementation of projects at the field level is the single biggest need now that policies, plans, laws and structures have been put in place. The political will is there to do this as is the public support. World Heritage listing will provide additional incentive to convert plans into action.

4. ADDITIONAL COMMENTS

a) Boundaries

One of the main issues in the preparation and evaluation of the LB nomination is what is the appropriate boundary? In Russia there was much confusion caused by the 1990 UNESCO fact-finding mission (Boyle et.al.) which appeared to require that the entire drainage basin be nominated. As this is an area the size of France containing 2.5 mil. people in several large industrial cities, such a boundary would not be appropriate or consistent with Operational Guideline 44*vi*. After extensive discussion with the Russian authorities it was agreed that the ideal boundary for the World Heritage site would be the central core zone consisting of the Lake and the surrounding protected areas and other lands within the immediate coastal protection zone. The only difference from the core zone would be that the World Heritage site would not include five large urban centres located along its shores. These are major developed areas with significant resident populations and include the towns of Baikalsky, Sludyanka, Kultuk, Kyahta, Babushkin and Sererobaikalsk. A clear 1:250,000 map is available which precisely

delineates the World Heritage site boundary. The total size would be approximately 8.8 mil. ha. of which 3.15 mil. is the surface of LB itself. The total area of the three nature reserves and two national parks is also included and amounts to 1.9 mil. ha. Other regional parks and other lands in the coastal protection zone make up the remaining 3.8 mil. ha.

It is recognised that this 8.8 mil. ha. site exists within a much larger drainage basin (60 mil. ha.) and that its integrity is very much dependent on the surrounding zones as defined in the Baikal Law.

b) Multiple Use

As with many other World Heritage natural sites, there is much human activity that takes place inside the boundaries of this 8.8 mil. ha. proposed World Heritage area. These include commercial fishing, some forestry, pastoral and agricultural uses, hunting, and tourism. There are a number of small villages and a portion of the Trans-Siberian railway through the site.

c) Cultural Values

The Baikal region has some 1200 historical, archaeological and cultural monuments of which 1000 have state protection. A number of these are considered sacred. There is also a mix of distinctive cultures in the region and an interesting human history. The site, however, has not been nominated under any cultural criteria.

5. EVALUATION

LB presents a classic case for a World Heritage site meeting all four natural criteria. The Lake itself is the centrepiece of the site and it is its largely unseen underwater features that are the core of its value to both science and conservation. The surroundings of the lake with its taiga-clad mountain scenery and wildlife resources still mostly existing in a natural state is an added bonus. LB is in a class by itself, a limnological wonder and a region of superlatives:

- The geological rift system which gave rise to LB was formed in the Mesozoic period. LB is thus the oldest lake in the world as well as the deepest. Various tectonic forces are still on-going as evidenced in recent thermal vents in the depths of the lake (criterion *I*).

- The evolution of aquatic life that has taken place over this long period of time has resulted in an exceptionally unique and endemic fauna and flora. LB is the "Galapagos of Russia" and is of exceptional value to evolutionary science (criterion *ii*).

- The picturesque landscape surrounding the LB depression with mountains, boreal forests, tundra, lakes, islands and steppes provide an exceptionally scenic setting. The single largest reservoir of freshwater on earth (20% of the world's total) is found here which is an additional superlative phenomenon (criterion *iii*).

- LB is one of the most biodiverse lakes on earth with 1340 species of animals (745 endemic) and 570 species of plants (150 endemic). In the forests surrounding the lake there are an additional ten IUCN Red Data Book threatened species along with the full complement of typical boreal species (criterion *iv*).

IUCN is concerned, however, that there are serious threats to the biotic communities in Lake Baikal and that there is a danger that its unique ecosystem properties could be lost. To address these issues of integrity, various steps are being taken to reduce these threats and there is strong support by all levels of government and the Russian public to implement the required actions. The property is of substantial

size with a buffer zone around it. Policies and structures and laws are either in place or are in the advanced stage of approval. Valid concerns regarding conditions of integrity were expressed by the Bureau. Due to recent changes in the administration of nature conservation within the Russian central government it has not been possible for a detailed statement on when the Law is expected to pass and which other measures will be undertaken. Based, however, on direct discussions with senior central and regional government representatives during the field mission in June, IUCN suggests that the best interests of conservation of LB would be served if the Committee would act on the nomination at this time.

6. RECOMMENDATIONS

Lake Baikal with the 8.8 mil. ha. boundary as described in section 4, meets all four natural criterion and should be inscribed on the World Heritage List. The Committee should underline to the Russian authorities the importance of: (1) final passage of the Federal Law on the Protection of Lake Baikal; (2) conversion of the pulp and paper mill at Baikalsky to eliminate it as a pollution source; (3) the initiatives of the authorities to continue to reduce pollution loads in the Selenga River; (4) providing more resources to the management of the nature reserves and national parks surrounding the lake; and (5) continuing and further supporting the research and monitoring activities on the Lake.

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