SOCIO-ECONOMIC ISSUES AND ENVIRONMENTAL IMPACTS IN TRANSBOUNDARY WETLANDS OF ARGUN\ERGUNA MIDFLOW

MIDTERM REPORT OF ARGUN/ERGUNA MIDFLOW BIRD CONSERVATION PROJECT SUPPORTED BY CONSERVATION LEADERSHIP PROGRAMME. 2007*(ABRIDGED)*

Natural History, Biodiversity and Ecological Flow Patterns:

The Erguna/Argun River straddles the China-Russia border in northeast Inner Mongolia (China) and Chitinskaya Province(Russia). The wetlands that are supported by the Erguna River and tributaries provide habitat for breeding populations and internationally significant numbers of several IUCN Red List and migratory species. These wetlands belong to two globally important ecoregions: Daurian Steppe Ecoregion and Amur Basin Wetlands and Rivers Ecoregion and extend northwards and eastwards from the Important Bird Area (IBA) of Dalai Lake Nature Reserve.

Formation of Erguna river basin system in geological times is a complex issue. Most experts believe that current river system was a result of merging of two to three different basins, some of which originally drained not into Amur river, but in Yellow sea, and more recently into large land-locked salt lake, with Dalai and Buir Lakes being remnants of it. Nowadays this river runs westwards from western slope of the middle part of Great Hinggan Mountains in China where it is called Hailar River. Just in 25 kilometers from Dalai Lake it makes a wide curve, hits Sino-Russian border and under the name of Erguna/Argun flows in the opposite direction towards north-east. At the curve it was connected to Dalai lake by a small Mutnaya stream severly altered by mining and railroad building in the beginning of the 20th century, and finally substituted by man-made Xinkaihe canal. Like many other lake-stream systems in steppe region water in small stream sometimes flows from Dalai to Erguna and sometimes in opposite direction, depending on whichever water level is higher. East shore of Dalai lake still bears signs of large delta of ancient Hailar River from thousands years ago, suggesting that most of its flow had run through the Dalai Lake in past geological times. Under the name of Erguna/Argun the river once again reaches foothills of Great Hinggan just about 300 kilometers north of its own source and dissects mountain region in nort-north-east direction until it forms Amur river at its confluence with Shilka River. The subject of our study is mainly the middle part of Erguna that makes a loop in the steppe region, while upper and lower parts flow in the same Great Hinggan Mountains. Here we find well developed floodplain wetlands along the Hailar/Erguna main stem at its tributaries such as Moergol and Huihe. Most developed stretch of floodplain wetland 250 kilometers long and 5-15 kilometers wide is situated right on the Sino-Russian border.

Climate conditions have a pronounced drying gradient from north-east to south-west with further local variations. While forest-steppe in Great Hinggan foothills may receive well over 400 mm of rainfall, dry steppe near Dalai lake may well receive much less than 300 mm a year on average.

As climate, geology and geomorphology suggest great spatial diversity of ecosystems, climate cycle add a lot to temporal diversity and connectivity of habitats. In the course of climate cycle with a 25-40 year span ecosystems of Daurian ecoregion are subject to drastic changes. Dalai Lake that can cover 2300 sq. kilometers and depth of 7 meters, in 1904 was a small chain of shallow 1m deep pools. Thousands of smaller steppe lakes dry completely in water-deficient periods, while flow of Argun/Erguna at the border fluctuates from 1,5 cubic kilometers per year to more than 6 cubic km per year. Many smaller streams dry completely or flow only during rainy periods. These cyclical changes are more evident in lakes, generally following long 30-year cycle, and less pronounced in large stream valleys that are sustained by influx of water from mountains even in some dry years. Since sources of Erguna and tributaries are in Great Hinggan and Dalai and Buir Lakes are fed both from Great Hinggan and Henty Mountains of Mongolia water abundant and water-deficient years do not coincide in different subbasins of Daurian ecoregion. Droughts have influence on water flow, mosaics of wetland vegetation, chemical composition of water.

In Daurian ecoregion protection of single wetland-steppe clusters makes relatively little sense, since most of charismatic fauna migrates between these areas in the course of climate cycles. In humid periods steppe with large lakes and multiple small shallow pools becomes optimal habitat for most wildlife, while in dry periods forest-steppe and some floodplains of rivers with permanent flow provide smaller and sub-optimal but stable habitat and most of steppe becomes highly inhospitable area. Real picture is much more complicated and differs from species to species, and most rare species populations use territory of at least two adjacent countries. Probably, this complex cyclical draught is the most pronounced ecological process forming local ecosystem dynamics in Dauria.

Another important feature of Erguna floodplain is very active and complex meandering process, leading to formation of multiple oxbow lakes and complex mosaic of reed-beds, willow thickets, meadows and sedge bog habitats. Relatively small river has wide braided floodplain with high speed of bank erosion and quick redistribution of flow between many alternative channels. Constant change driven by uneven water flow and meandering greatly contributes to habitat diversity and species diversity. Interesting enough in transboundary stretch this process is perceived by both countries as “loss of motherland” and often confronted by unsound embankment building.

Surveys of the waterways, floodplains, marshes and oxbows of the Eerguna valley have found the area is a globally important breeding and stop-over site of many migratory waterbird species. Based on research of Dr. Oleg Goroshko, Arguna Wetland is one of the large breeding ground for the endangered Red-crowed Crane in the world. It also is part of the Daurian bottle-neck site of the continental branch of the global East Asian-Australasian Flyway. About 1-2 million birds gather there in spring and autumn. It is also an important area for rare bird species, supporting 19 IUCN Red List bird species. Internationally significant populations of Swan Goose, Red-crowned, Siberian and White-naped Cranes, Great Bustard, Red-necked Stint, Broad-billed Sandpiper, Bean Goose, Tundra Swan, Gadwall and Northern Pintail have been recorded in the area. Most work done in the Eerguna Midflow has been lead by Dr. Oleg Goroshko on the Russian side of the border. According to him, the whole Eerguna-midflow wetland cluster meets Ramsar criteria: 1a,1c,2a,2c,3a,3c (Goroshko 2006) and criteria for international IBA: a4(i), a4(ii), a4(iii), a4(iv). It is listed as IBA#57 in the latest IBAs of Asia list, in the Russian section. Since meandering Argun/Erguna and floodplain wetlands are holistic inseparable ecosystem and national border follows mainstream of the river all general values should equally apply

to China part of floodplain. Tables 1,2, present figures for the whole Dauria ecoregion, while Table 3 with data from Russian side shows significance of Erguna Midflow.

Table 1 Importance of Daurian ecoregion for conservation of some rare birds species

(After Goroshko, 2006)

Species	Number in the region	
	ndividuals number	f world population
Swan Goose (*Cygnopsis cygnoides)*	41000	75
Great Bustard (*Otis tarda. dybowski*)	1050	66
Demoiselle Crane *(Anthropoides virgo)*	73000	37
White-naped Crane *(Grus vipio)*	1400	29
Relict Gull *(Larus relictus)*	2430	20
Japanese Crane *(Grus japonensis)*	275	13
Hooded Crane *(Grus monacha)*	1200	13
Asiatic Dowitcher *(Limnodromus semipalmatus)*	300	2

Table 2. Importance of Dauria ecoregion for conservation of some migrant birds species

(After Goroshko, 2006)

	ber of birds dividuals)	s migrating along East Asia-Australian flyway
Gray Plover (*Pluvialis squatarola)*	6500	40
Lesser Golden Plover (*Pluvialis fulva*)	8000	50
Wood Sandpiper (*Tringa glareola*)	2000	20
Rufous-necked Stint (*Calidris ruficollis*)	50000	32
Broad-billed Sandpiper (*Limicola falcinellus*)	4500	16

Table 3. Global significance of Argun/Erguna River Midflow wetlands in terms of share of bird populations (Goroshko et al 2006)

Species	ber of birds dividuals	ls in East Asia (*-% of world population)
Great Bustard (*O.t. dybowski*)	300	19*
Japanese crane (*Grus japonensis*)	45-60	2-3*
Wood sandpiper(*Tringa glareola*)	4000	6
Rufous-necked Stint (*Calidris ruficollis*)	5000	1*
Broad-billed Sandpiper (*Limicola falcinellus*)	800	2*
Swan goose(*Cygnopsis cygnoides*)	2000	3-4*
Bean Goose (*Anser fabalis*)	20000	36
Whooper swan (*Cygnus Cygnus*)	10000	17

Gadwall (*Anas strepera*)	25000	2-3
Pintail(*Anas acuta*)	20000	2

Information above shows both global significance of Argun Midflow wetlands for waterbirds and its role and important interconnection with the whole Daurian ecoregion. Altogether about 200 species of birds were registered in the Argun valley by ornithologists and 60 more species are suspected to be present judging by similar better studied habitats in other parts of Dauria.

Spring survey April-May 2007 has confirmed great significance of Middle Erguna for migrating waterfowl. In particular, significant numbers of Tundra Swan (2350), Bean Goose(23 000), Swan Goose(1600)were recorded in the area. Many of Swan geese divided in pairs which suggested they prepare to nest in the area.

Research on rare birds (Goroshko, et al) shows that in years of low flow volumes (2001-2005) their habitat in unique wetlands of Erguna has very clear adverse changes. Observations in the course of our project in 2006-2007 confirmed that floodplain habitat available for breeding rare birds has multifold decrease in times of draught. If in 2004-2005 up to 20 territorial pairs of Japanese Crane were observed in the stretch between Priargunsk and Abagaitui, while in June 2007 only one bird was observed in the same area. However, according to local herders and hunters, many more Japanese Cranes came in spring, but have gone from the area being unable to find suitable nesting habitat. The same pattern is observed in Swan Goose population. Common species of waterbirds breeding locally also decreased in number significantly.

Of course Erguna/Argun has other significant species diversity besides birds, but insufficient research precludes us from making total estimates of species diversity and population dynamics. More or less systematic inventory in Russian part was conducted in 2004-2005 by a Russian team tasked to plan a protected area along the river.(Goroshko, Kochneva et al.2005)

Altogether 38 species of mammals were registered in the area and 11 more are believed to be present. Pallas cat, River otter, Daurian hedgehog, Manchurian Zokor are among those most requiring protection. Wolves are still numerous and just at the time of our 2007 inventory attacked a sheep herd on Russia side. 5 wolves were killed in 2006/2007 winter in floodplain just around one village of Bogdanovka. Just a century ago the Argun Valley was an important migration corridor for Mongolian gazelle, but for last several decades only single individuals reach the area occasionally and are doomed due to suboptimal conditions and high harassment by humans (Kiriliuk, Chen Liang). Last 8 Mongolian gazelles that in 2001 migrated from Mongolia through Russian territory were killed by poachers in 2002.(Goroshko et.al.2005).

Fish fauna is in steady decline at least from end of the 1990-s. 41 species of fish are historically known from this stretch of Argun River. From this list more than half have not been confirmed during 2005 study by ichthyologist that involved both scientific sampling and questioning local fishermen. Mean fish productivity in May 2005 did not exceed 2 kg/ha while in comparable stretches of Shilka River it was 55 kg/ha, which shows that available fish habitat is severely depopulated (Mikheev 2005). 2007 questioning of Chinese fishermen confirms that the largest salmon species *Hucho Taimen* just recently has gone extinct locally, while Kaluga Sturgeon (*Huso Dauricus*) is not known by current generation of fishermen. Both charismatic species still have viable populations in adjacent Shilka River basin. In time of low flow period, like one that lasts from 2001 till 2007 fish populations of Argun has shown further significant decline.

4.Impacts of infrastructure, urban growth and industry on wetlands.

At the beginning of our report we promised to analyze environmental merits of one particular development – proposed large water transfer from Hailaer/Erguna river into Dalai lake. However, we need at least to describe shortly other major projects already undertaken in the area and describe general course of local industrial development .

4.1. Urban growth

Rapid urban and industrial development of **Manzhouli City** and Zhalainor town (with population around 200 000 soon surpassing prefectural seat -Hailaer City) is due to influx of cheap resources from Russia and possibly Mongolia(?). Urban growth coupled with water-thirsty industrial development at the spot with minimal underground water resources makes Manzhouli major future source of pressure both on Erguna-Hailar River and Dalai Lake. Now we can say with certainty that Hailaer water transfer project in a long term has an implicit goal to secure industrial water supply for Manzhouli –Zhalainor urban area. In a short term the City has just completed construction of the second water pumping station in floodplain section known as Erka wetland.

Manzhouli (in line with state-policy on border trade) encourages development of processing industries right in the border area, which results in greater water demand. Mineral exploration is also encouraged in the area, since presumably more investment funds are available here than in other counties. City's wastewater has natural outlet into Erguna/Argun River and the westernmost part of transboundary stretch.

Potentially good part of the equation is that unlike all other areas Manzhouli has resources both private and public, and by its nature is an international trade city may be more open to dialogue with environmental community.

In Russia the same border trade spurs development of a twin city across the border- Zabaikalsk. Due to smaller share of cross-border revenues and poorly developed business infrastructure scale of this development is smaller, but direction and problems are similar. Water supply is already a serious limiting factor, but development master plan prescribes rapid expansion of this small town. Town of Krasnokamensk, although distanced from river valley by a small mountain ridge, still has considerable impacts on Argun ecosystem. Long water supply pipeline connects this town with Argun River, while its wastewater presumably reaches the river through Urulunguy tributary. Krasnokamensk is the biggest town on Russian side with up to 40 000 residents, and if uranium processing facilities will expand as planned, the town will also grow.

From planning perspective, increasing amount of infrastructure in the areas with such obvious climatic fluctuations (and pronounced aridization trend added to it) will inevitably lead to huge environmental and economic risks and lossess. Both China and Russia could revise development plans and relocate investment and some import-export flows to the areas better suited for massive development. Areas where water abundant, ecosystems more resilient and fluctuations in biological productivity of landscape less pronounced. From this perspective even China's recent proposal to expand trading corridor through Priargunsk-Erguna counties in lower part of river stretch is worth exploring and assessing.

Infrastructure development.

Roads, bridges, pipelines are planned and built with astonishing speed in China part of the area. Little or no thinking is put into assessing environmental impact and ecological appropriateness of this infrastructure

In 2001-2007 the World Bank managed to support construction of international road from Manzhouli to Hailaer that for 15 kilometers dissected the core area of one of most vulnerable and valuable wetland areas –Erka wetland nature reserve. 2007 survey gives overwhelming evidence that the road affected water flow in whole floodplain, triggered influx of herders, fishermen and other newcomers right incide the wetland, created "bird-free" corridor across the wetland at least 1 km wide. From now on this wetland has a slim chance to be saved from full deterioration as bird habitat only under active costly management conducted in "wetland park" mode now popular in China. From economic standpoint the road shortened by 10-20 km the way from Hailaer to Manzhouli.

Simultaneously a new paved road was built along the whole border stretch of Erguna River from Heishantou to new international road bridge opening this area to development. Taken together these projects drastically improved access to steppe and wetland areas along Erguna river in Xinbaerhu and Chenbaerhu counties, which will inevitably attract new visitors, settlers and businesses to this fragile area.

Observations and polls in summer 2007 show that on steppe lakes which have even local paved road running along shore we have counted much smaller number of birds, than on those which do not have paved road besides. Interesting enough, in spring during migration this difference was much less pronounced.

Massive construction of state-sponsored "model farms", "model tourist camps", "model production bases", half of which are never completed or already abandoned impresses anyone moving along new and old major roads. While each of such sites is just a memorial to waste of money, together they present an alarming trend in local land-use, when both land and resources are simply wasted to achieve immediate gain in the form of state subsidies or private investment. Many of those are established on old communal pastures by newcomers or local big wigs, while local herders were relocated elsewhere.

In sharp contrast to China, Russian part of the valley has virtually no large new infrastructure, except for some pig farms built in cooperation with Chinese. Barbwire fence that marks the "border zone" remains the largest and most influential piece of linear infrastructure in the valley. To certain extent it limits access to the floodplain and some valley slopes, thus indirectly having some conservation value. At the same time it gives the border guards the sole right to determine who is fit to use resources of the Argun riverbank.

As mentioned before, new international bridge reestablished connection between Heishantou and Starocurukhaituy in early 2007. This is one of two oldest official trading corridors on the Russia-China border, which however has never been fully developed since its establishment in 1727. New bridge is used for exporting coal to china and probably for importing some commodities. Adjacent Erguna City proposed to build a railroad to Priargunsk, creating alternative for Manzhouli border crossing. If Russian plans of expanding mining in areas to the north of this point become true, this plan is quite likely to materialize.

Mineral extraction

Mining always has been the principal industry in Erguna basin with heavy toll on environment (gold-mining started in XVIII century). We see rapid new rise of mining throughout western part of Amur basin in all three countries and explicit major threats to key habitats and river courses. Therefore if we consider long-term work in the area to save whatever wilderness is yet possible to save, we are likely to face this issue in highly transboundary context, since all mines serve demands of more or less the same markets. For example, recent proposal to transfer flow of 3 major rivers in adjacent Eastern Mongolia (Kherlen, Onon and Baldj) also has mining industry demand as driving force behind it.

Oil exploration and development is an ever growing impact on Dalai Lake nature reserve and vicinity. Potentially it is a threat to Huihe, Huliyetu and other major wetland sections, since oil deposits are often associated with wetland complexes.

Deposits of low-quality coal are widespread in the river basin and their exploitation is accelerating. We had a chance to visit 3 coal mining sites and two exploration sites and clearly can conclude that both in China and Russia coal mining is a major growing impact in Erguna/Argun River basin. In China examples include;

1. Dalaihu NNR and Erka NR both presently receive significant part of water pumped from old coal mine in Zhalainor. This mine with 100 years of history once disrupted natural flow between the Dalai Lake and Argun river via Mutnaya channel. It also should contribute to change in water tables in vicinity of two nature reserves. 3-6 new mines for coal, silicon and other commodities are developed in this south –west corner.

2. Moergol River Valley has 2 new coal mines rapidly developing right near the floodplain (and partly expanding on floodplain) with obvious dramatic impact on local hydrology and likely link to severe deterioration of water quality in Moergol River wetlands and Huhnor Lake.

3. Floodplain at the confluence of Genhe and Erguna is presently a site of intensive coal exploration with several crews digging wells(shafts), and mine development in Erguna wetlands NR is scheduled right at the end of 2007 in Erguna Wetland nature reserve..

In Russia so far only one poor quality coal deposit is exploited ner Kuti village on the edge of river valley, and coal exported to China. We know well that 3-4 additional mining sites are planned or redeveloped in Middle Argun river valley on Russian bank, at least two of them planned as joint Russia-China enterprises (Zadorozhny 2006).

Most of Russian new mining operations are triggered by international market demand, large part of which is China's demand. Gas pipeline from Kovykta gas fields north of Baikal Lake is likely to be laid through Zabaikalsk and then follow the China Eastern Railroad to the Daqin City.

Large Uranium mine in Krasnokamensk, located 50 kilometers north of river valley, uses water from Argun/Erguna, but reportedly discharges water only in small closed inland basins. Air pollution is likely current serious hazard affecting our study area, but no incidents of polluted water discharge were reported. Given enormous tailings stored from 50 years of operation and plans to expand processing of ore from other deposits we consider this mine a potential source of water pollution, which if released would go into in Argun/Erguna via Urulunguy tributary with its mouth at Priargunsk town right at downstream end of our study area.

Further downstream a questionable gigantic plan to build 5 mining and processing facilities for various types of ore lined along Lower Argun/Erguna at 70-100 kilometer distance from main stem was promoted in 2006-2007 by Chita Government.

Lack of environmental planning and enforcement in mining sector is obvious both in China and Russia. Mere incorporation of environmental mitigation costs into planned projects might make other deposits located outside of wetlands equally attractive for development.

-Better coordination in supply-demand chain might lessen incidence of simultaneous development of dozens of new mines. Presently every county insists on development of its own mine for local lack of coal, which is likely to be result of bad policy on pricing or some management failure).

-Zhalainor, Moergol and other already operating mines can be forced to process wastewaters, which they presently just dump in the nearest water-body. If some artificial reed-bed could be used for purposes of water treatment , such measure will provide unique opportunity both to improve water quality and expand habitat suitable for rare birds.

-At least in Moergol Dongming mine with huge water discharge system provides preferred staging areas for waterfowl (with up to 40 000 geese and ducks and several cranes observed at resting area formed by water discharge in April-May). Whether it is good or bad for birds should be explored further, since the answer guides mitigation strategy.

As we see most best accessible oil, coal and other deposits(except for uranium) coincide with best preserved wetland areas. It is obvious that if current mining expansion goes unchecked and impacts unmitigated, just in 10 years half of most valuable wetland habitat in China part and unknown share on Russian part will be severely affected by mining.

Water infrastructure and water use. Hailaer-Dalai Water Transfer project

General water management concept in China part.

In China, as compared with Dalai Lake Basin, the Erguna valley is locally considered a water-rich area, which encourages rather irresponsible water use. As a result, there is a local belief that more pressure can be put on the Erguna to alleviate problems elsewhere. The most extreme example of this is a proposed water transfer from Hailar/Erguna River to Dalai Lake.

Official estimates are that only 0.95% of surface water resources are being used in Hulunber prefecture, while actual accessible resource is 6,43% out of total runoff. Given that water withdrawal for irrigation projects that we witnessed in Erguna city and Chenbaerhu Banner is not reflected adequately in statistics this may lead to flaws in water management decisions. But in general, streams of Erguna Basin are practically free of dams and therefore no major withdrawal is possible. Just for comparison, in two other prefectures of Inner Mongolia Tongliao and Chifeng located nearby surficial water withdrawal reaches 25%.(CAE 2007)

To “improve” the situation up to 10 new water infrastructure projects are planned:

Honghuaerji, Zhaluomude, Daqiao, Zhashuhe, Dayankuang and other new reservoirs will support mining and agricultural development. The first large reservoir is under construction on the Yiminhe River – the principle tributary of the Hailar-Erguna River and another planned on Hailar river upstream from the city. Water transfer from Halaha (Khalkh-in-gol) River to the Xillingol basin is also planned. The Halaha is the main tributary of the Dalai and Buir Lakes.

Therefore as these projects are implemented flow patterns of Erguna might change significantly, even if Hailar-Dalai Transfer does not happen. Data on likely redistribution of seasonal flow are difficult to obtain. Impact assessment of cumulative influence of upstream water infrastructure on transboundary stretch of Erguna has not been undertaken and is quite unlikely to be undertaken in near future.

However we dwell in detail on proposed Hailaer-Dalai Transfer infrastructure project, which if implemented may significantly alter environmental flow both in Erguna/Argun river valley and Dalai lake basin. This example is even more interesting since “saving environmental balance” is at the heart of official justification behind this huge water-transfer project .

Water transfer project proposal status

The proposal is to divert water from the Hailaer River to Dalai Lake. Ordinarily, the water of the Hailaer River flows from east to west before turning north-east about 20 km north of Dalai Lake. At this point, the Hailaer River becomes the Eerguna (Chinese name) or Argun (Russian name) River and forms the Chinese-Russian border in this area for 900 kilometers. The proposed canal would divert an annual volume of approximately 1 cubic km of water to Dalai Lake per year. Actual flow capacity of the canal is 70-93,6 cubic meters per second, while average flow of Hailaer(upper Argun)River at the construction point is 117 cubic meters per second. This means that judging by its size the new canal is probably capable to divert about 60-75% of the water from Hailaer River, if equipped with pumps.

However project documentation states that canal will divert water in amounts somewhat proportional to river flow volume in amounts up to 28-30% of average annual flow of Hailaer river. More specifically it will not divert any water when flow is less than 11,9 cubic meters per second, divert 71 cubic meters per second when Hailaer flow is 198 cubic meters per second (36 %), and divert maximum of 93.6 cubic meters per second when Hailaer folw is 253 cubic meters per second. Diversion will occur in warm period of the year from May to October/November. Projected unproductive loss of water through canal bottom before it reaches destination is estimated at 20% of total diversion volume.

In Dalai Lake area similar rather unsuccessful project was implemented in the 1960s when new Xinkaihe canal was built to direct water of the rapidly rising lake into Argun/Erguna River. Due to poor maintenance canal was broken in 9 years. Now the plan is to create another canal from Hailaer River in order to confront decrease in water levels. It seems that both plans do not take into account natural dynamics of the Lake and therefore are tremendous waste of resources. Project documentation also hints that part of diverted water will in future contribute to outflow from Dalai lake to Erguna River via Xinkaihe channel in water-abundant years.

Over the last five to six years, Dalai Lake has held a reduced volume of water due largely to low rainfall, which resulted in lowering water level, lake area and overall volume. The reasoning given for the diversion of water to the lake is to protect this environment from the assumed negative impacts of these low rainfall years. In particular it is expected to arrest further salinization, reduce eutrophication, prevent desiccation of adjacent grasslands, etc. The proponents also expect that higher water levels will help replenish diminishing fish stocks in Dalai Lake, provide water for additional 40 000 livestock and 2000 hectares of irrigated hayfields. An associated project will use Dalai Lake water to supply the municipal needs of Manzhouli City – the major crossing at the Russian-China border.

Potential Impacts:

Impacts of this project are very diverse and complex. Formal Environmental Impact Statement (EIS) was prepared in China in 2005, but it does not address complex interplay of ecological processes and ecosystem dynamics. It has never been a subject of rigorous scientific review and discussion. Below we present our brief analysis of potential consequences, outlining important issues that require further assessment.

Dessication of downstream wetlands

The most obvious potential impacts are on the downstream habitat of the Hailaer-Eerguna River system. The Eerguna (Argun) River is a relatively fragile branch of the Amur-Heilong River catchment with a total annual flow of between 1.5 cubic km in low rainfall years and 6 cubic km in high rainfall years(only in 2004 flow was about 3.0 cubic km). Similar to Dalai Lake it has had reduced annual inflow of 1.5-1.7 cubic kilometers since 2001. The river does not have any significant tributaries for at least 200 kilometers from the point it comes to the border to the mouth of Gen River at Heishantou-Priargunsk border crossing. It does not take great imagination to see that the removal of 1 cubic km of water from this system per year is likely to have significant downstream impacts.

Project EIS does not clear depict the difference between Dalai lake ecosystem adapted to long-term changes of water level and Erguna river floodplain ecosystem which has very different dynamics dependent on frequent floods and not adapted to long-term water deficit.

EIS has been done on assumption that water after initial 5-15 years following canal construction accumulates in Dalai lake to the level of 544.8 meters ASL and once again starts flowing via Xinkaihe channel into Erguna River almost in the same amount. This prediction done by hydro-engineers is very difficult to believe in, since data on historic water balance of Dalai Lake presented in EIS state that in

last 40 years the lake an average released into Erguna river was very small (0.09-0.144 cubic kilometers a year), although the Lake water level often exceeded "projected level" established by the project and at average was 544.5 meters ASL. Given many other uses of diverted water quoted in press, such replenishment is even less likely. EIS also mentions that Xinkaihe canal is in poor broken condition and cannot presently deliver large amount of water into the river, which presents additional flood hazard in water-abundant years. Given all uncertainties most likely the flow via Xinkaihe will not increase, and if it does – it will happen only in extremely water-abundant years, while in all other times water deficit downstream will be equal to the full amount of water diverted from Hailaer.

Other major concerns are associated with 'filling time period", when lake will not have any discharge into the Erguna river, even that minimum it has nowadays. This period may last 5-15 years after canal construction – time likely fully sufficient to degrade river wetland downstream, and no detailed analysis of ecological consequences is done for this critical period. Another key question is absence of any detailed analysis on overlap in time periods when draughts affect Dalai Lake and Hailaer/Argun valley. Meanwhile greatest competition for water between the project's needs and natural needs of the Erguna River will occur in these periods.

We believe that the proposed action is extremely likely to decrease the quality of the wetlands along the Eerguna River to the point that they no longer provide viable habitat for large populations of waterbirds and numerous other species that rely on wetland habitat. Diversion in low-flow period will result in drastically reduced flow downstream, leading to lowering of water tables, reduced water retention and dessication of floodplain wetlands, dissapearance of many shallow water habitats, drastic change in sedimantation and channel formation patterns. Proposed diversion of up to 30% of annual average flow may also leave the downstream stretch without sufficient flow during the high rainfall period in summer, the river will not break its banks to inundate the floodplains and marshes and the bulk of the wetlands will simply dry out.

Drastic alteration of Dalai lake ecosystem

The other possible set of impacts relates to potential impacts from altering the natural high-low volume cycle of Dalai Lake. It has been shown that the Dauria area experiences 30-year climatic cycles of high rainfall-low rainfall years. At the moment, we are in a low rainfall period that is not expected to end until 2010 and after that the water levels of Dalai Lake will rise again. So far climate change impacts on water volume of Dalai Lake and similar lakes in Mongolia and Russia seem to be less pronounced than this regular cyclical changes.

Dalai Lake is known to become almost dry in 1903-4 (as even acknowledged in EIS report for this project), similar Torey Lakes in Russian Daursky Zapovednik and Hoh-Nur Lake in Mongol-Daguur Zapovednik dried several times in the 20th century and are shrinking now as well. The point is that, while the proponents of the project are advocating the environmental merits of the project for the lake,

the truth is that we do not know how this artificial stabilization of lake water levels and loss of the wet-dry cycle will affect the ecosystem of Dalai Lake. However, we do know that this lake is not dissimilar with all other brackish lakes of Dauria, which periodically dry out naturally. The regional biota is adapted to such a natural cycle. This was studied on similar large Torey lakes in Daursky Biosphere Reserve, Russia, and on smaller lakes of the steppes, and at least for fish there is an evidence of higher productivity of such "pulsating" water bodies, if compared with spring-fed lakes with stable water level in the same region.

Only one line in the Project's EIS states that fluctuation of water level is major factor sustaining diverse and productive belt of wetlands on the border between lake and steppe. However EIS recommendation to sustain this fluctuation within +/- 20 centimeters from "projected water level" is unfounded. It is very evident that both diversity of species and habitats and high productivity of brackish lakes of Daurian steppe is largely a result of current drought cycles associated with much higher amplitude of natural changes. Project will halt or diminish this natural phenomenon on Dalai Lake and likely result in decreasing biodiversity and productivity of this ecosystem in a long term.

In the same EIS comparison of water quality in river and lake ecosystem based on "drinking water standards" fully disregard the fact that at different stages of draught cycle steppe lakes have very different natural water quality. Therefore halt or decrease in natural fluctuations in salinity likely will have adverse impact on unique character of aquatic ecosystem and is highly unlikely to result in long term gain in fisheries.

A precautionary approach should be taken, particularly given the acknowledged importance of Dalai Lake as a National Nature Reserve, component Reserve of the Dauria International Protected Area, Ramsar site, UNESCO Man and Biosphere Reserve, International IBA and Important Shorebird Site of Wetland International's Shorebird Site Network, North East Asian Crane Network Site.

Increased accumulation of pollutants:

Another grave concern is that the Hailaer waters are highly polluted by all major settlements and industries of Hulunbeier prefecture to a point that has necessitated the formation of a special international Russian-Chinese commission in 2003. Favorable influence of such water on the Dalai Lake ecosystem, fisheries, etc. is highly unlikely, and quick deterioration of hydro-biological system due to massive influx of new pollutants and pathogens is very probable. Unlike Argun river presently receiving this pollution and bringing it further downstream, Dalai Lake is likely to accumulate most dangerous non-degradable pollutants. Presently, absence of major point-source pollution in the whole Dalai Lake watershed is the best safeguard for its unique ecosystem. Occidental spills(or intentional dumping) of various chemical substances frequently happening on Hailaer River (according to Russian monitoring stations downstream) further increase these risks.

Disrupting animal migration cycle in Daurian ecoregion

The wetlands of the Dauria eco-region are, as far as the birds and other migratory fauna are concerned, all part of an interconnected system. If the habitat provided by Dalai Lake is non-optimal for fauna during low rainfall periods, the birds and mammals will find an alternative suitable site within the impressive wetland complex of Dauria (encompassing China's Eastern Inner Mongolia, Russian Chita Province, and Eastern Mongolia), that has experienced greater rainfall or that provides more stable habitat during low rainfall periods. Later, when rainfall and lake water levels have increased, the fauna will return to Dalai Lake. Interference with the flow of water will alter this flow and movement of fauna and affect the ecology of Dauria, which is a Global 200 ecoregion, in unknown ways. Therefore, the complex ecological interplay between the various wetland areas within the Dauria ecoregion, which currently supports the impressive populations of wetland species seen in the area, contradicts any argument suggesting that the proposed water diversion will provide a required conservation outcome.

.Damage to nature reserve network development.

Extensive potential impact on ecosystems is especially evident looking at nature reserve network:

In China diversion will have even greater impact on Erka municipal nature reserve right downstream from point of diversion. This highly important habitat of many rare birds and stop-over site for migrating Siberian Crane already suffered from an international road built through it in 2005-2007 with World Bank assistance. Available documents contain clear reference that the impact on adjacent Erka wetland could be offset by artificial inundation with water from the same canal. This is definitely not an option for all other wetlands of Argun (Eerguna) Midflow further downstream.

The Eerguna Wetland Provincial Nature Reserve, on the confluence of the Gen and Eerguna Rivers will be profoundly impacted by the proposed water diversion. Approximately half of 120 000 ha floodplain wetlands within its bounds are fed by Erguna river flow.

Huliyetu district-level wetland nature reserve(60 000 ha), lying in Erguna Midflow between the project site and Gen River mouth is known as extremely important habitat for 5 species of cranes (Li Xiaomin, 2000) and it's wetlands and lakes are fully dependent on Erguna river flow.

As indicated earlier in Dalai Lake National Nature Reserve ecosystem is likely to be dramatically altered and practically converted into artificial reservoir with controlled water levels. Besides this major impact there are several other project influences on this nature reserve. There is no find satisfactory calculation of additional sediment load carried by new canal in EIS. Meanwhile Hailaer River has very impressive sediment load and part of it is destined to settle down in the lake making it even more shallow or in the canal. New water (and sediment) flow from new canal will enter Dalai Lake Nature Reserve within the core zone (!) where any alteration is strictly prohibited.

The last but not the least the canal will likely affect migration of last remaining Mongolian gazelle, whose last small herd is regularly observed in the area directly adjacent to the canal construction line. Additional linear infrastructure definitely decreases any chances for gazelle restoration in the nature

reserve core zone north-east of Dalai lake. SEPA suggested to confront it by "building artificial passes for animals", which is unlikely to be an effective solution.

Russia is in the final planning stages for the development of a Nature Reserve along the Argun River between Abagaitui and Heishantou. A 150 kilometer long "Wetlands of Middle Argun " national-level protected area planned in 2004-2006 and presently in under final approval process in Chita Regional Administration. Values of this new protected area diminish dramatically if flooding regime of Argun River changes.

All abovementioned reserves were studied by scientists of Daurian International Protected Area (DIPA) and since 2006 trilateral meeting of DIPA officially targeted for coordinated management and monitoring. If the project is implemented it will decrease the chances of DIPA reserve network successful functioning into the Erguna Midflow, which had been discussed as a very likely development. Plans to form a trilateral international biosphere reserve also are likely to be reevaluated if such a project is implemented, as are plans for the first tri-lateral "Daurian Steppe" World Heritage Site nomination. The same issues relate to the projected establishment of a bilateral Ramsar site (and trilateral Ramsar complex), since the Erguna (Argun) Midflow definitely meets Ramsar criteria and three adjacent areas in DIPA are already Ramsar wetlands of international importance.

Important socio-economic issuess:

- Water Quality and Equality of Access to Resources: The project will reduce water available for human use, agriculture, fisheries and pollution dilution further downstream, which will negatively affect the well-being of the already economically depressed districts of Xinbaerhu, Chenbaerhu and Erguna in China and Zabaikalsk, Krasnokamensk and Priaargunsk in Russia. Eerguna River is the only sizable source of water all the way to the Gen River mouth, and presently without any project there are already issues of water resources deterioration affecting local people. Even now, just in time of draught, people on both banks are forced to deepen wells or buy water from outside, stop fishing operations for lack of fish, stop grazing and haying on slope valleys for lack of grass, and are severely affected by pollution. Water transfer will prolong draught periods in Erguna Valley and exacerbate all these problems.

The project will reinforce unsustainable trend in water-use in Hulunbeier prefecture. Many potential water-consumption projects are discussed in local Hulunbeier press as dependent on this water transfer. EIS does not provide clear figures, but if projected loss due to percolation underground (20%) is summed up with 0,3 cubic kilometer for needs of nearby cattle industry and hayfields, and 0,14 cubic kilometer increase in supply to Manzhouli city is added on , the maximum water volume actually available to replenish the Lake would be about 0,5-0, 4 cubic kilometers out of 1,05 cubic kilometers diverted from Hailaer River. This means that at the time of project completion "consumptive use" of diverted water may leave even smaller amount for "environmental purposes" under disguise of which this project is conceived.

Possible international policy consequences

The proposed project will be damaging to China-Russia relations and bi-lateral co-operation on conservation matters, particularly since:

1)There is an existing agreement between Inner Mongolia and Russia to protect the waters, biodiversity and landscapes of Eerguna River. Unilateral decision to alter this ecosystem by water diversion is clearly contrary to the objectives of this agreement.

2) Conditions and even configuration of border line that goes along farwater(deep water) of Argun/Erguna will drastically change with the change of river flow. There is a fair amount of tension over border line and unilateral dyke/embankment building even without water transfer and it may increase multifold as project progresses.

3) Decrease in quality of environment, availability of water and productivity of agricultural land will result not only to worse living conditions for local Russians, but probably in lessening cooperation with China side in border districts due to this decline in resources. Presently local Russian economy is increasingly dependent in Chinese investment in natural resource extraction.

4)The project presents a classic example of introducing inappropriate engineering solutions to deal with natural water scarcity, instead of adopting sustainable land-use strategy adapted to regional ecological conditions. If implemented it will trigger similar efforts to divert Kherlen and other rivers in Mongolia and will fully preclude the three countries from establishing a coordinated, equitable and ecologically-sound water use regime in the Amur River headwaters.

5) Project challenges many international efforts to protect endangered species, first of all rare cranes and geese, and secure networks of suitable habitat across North-East Asia flyways. Since important migratory routes are affected, negative consequences for various species populations are possible in many remote areas (even in Australia).

Root problems underlying the project.

The Project does not address root causes of environmental degradation that now progresses both in Dalai lake area and Erguna river area: reduced water retention capacity of upstream forests, inappropriate agriculture leading to erosion, growing pressure on Dalai lake from expanding economy of Manzhouli City, etc. Multitude of more effective methods to confront environmental degradation and protect natural ecosystems could be used in Hulunbeier Steppe, rather than trying to achieve ever greater change of natural ecosystem dynamics by proposed water transfer.

Rarely one could see such a small engineering endeavor that could result in such a large dangerous changes in natural ecosystems. At larger scale of Daurian (Hulunbeier) steppe ecosystem as a whole the project will most likely result in drastic decrease of habitat value of both Erguna floodplain wetlands and Dalai lake ecosystem and will significantly diminish their natural character, sharply decrease habitat available for breeding in most critical draught years.