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Project "Development and improvement of policy instruments for Environmental Protection"

Pilot project "Development of a local action plan on environment protection in the Ili-Balkhash river basin"

THE LAKE BALKHASH PRESERVATION PLAN

This project is developed within the frameworks of the Pilot Project "Development of a local action plan on environment protection in the Ili-Balkhash river basin" and as part of the Project "Development and improvement of environmental policy instruments" of The European Union and The Ministry of Environmental Protection of Kazakhstan.

Table of Contents

1. Introduction. Frameworks of the Plan

Ili-Balkhash river basin (IBB) covers water collection river territories feeding Balkhash lake. It includes entire or partial territories of four administrative regions (oblasts) of Kazakhstan: Almatinskaya, East Kazakhstan, Karagandinskaya and Zhambylskaya; the largest city of Kazakhstan, i.e. Almaty, as well as north-western part of Xinjan-Uigur autonomous district of the People's Republic of China.

In line with this, the official sources use the name of **Balkhash-Alakol basin (BAB).** This territory, unlike the geographic IBB, is defined based on water resource management conditions. BAB includes, in addition to geographic IBB, Alakol-Sassykkol lake system and excludes water collection territory of XUAD in China. In the official statistics, reports, and other documents, used in this work, there are data on BAB.

Most of measures of this Plan can be implemented within 5 years.

2. Background and the objectives of the Plan

BAB is a unique natural complex on the planet. It stretches for 900 km. from west to east and 680 km.from north to south, from the deserts and semi-desert in the north of the basin up to the alpine and subalpine meadows and alpine snowfields and glaciers in the south. This is one of the world's largest lake ecosystems. The basin area is some 413 thousand square kilometers which exceeds the territories of the UK, Denmark, Switzerland, Holland and Belgium all together. (Appendix 1 contains a map of BAB). In 2009, the basin had more than 3 million people. Every year the population increases by 20-25 thousand people.

The main wealth of the basin is fertile land and fresh water, mainly from glaciers in the amount of 18 to 31 cubic km. per year. The energy potential of rivers comprises more than 7 MW, fisheries - up to 30 tons of catch per year, the area of farm lands is 39.8 million hectares, and the area of irrigated lands is around 653 ha. There are large deposits of coal, copper, polymetallic ores, and precious metals. Railway and motor transport communications are developed, and the largest airport of the country is located here. There is also an opportunity to re-organize navigation in the Ili river for cargo, passengers and tourists, including navigation into China.

The basin has a great potential for tourism development: from ski slopes, unique curative mud and mineral water to the tourist routes of the Silk Road through the monuments of ancient cultures. This is one of the few places where one day you can see all the natural zones: from high snowy peaks and glaciers to sandy desert.

Environmental sustainability of the lake - is an integrated indicator of the efficiency of all economic activities in the basin and regional and international politics in general. The Lake supports the balance of many ecosystems that provide favorable treatment for life in the region and reproduction of water resources, soil fertility, fauna and flora. However, due to climatic conditions and environmental characteristics, this equilibrium is very fragile and even small anthropogenic impacts can cause significant adverse changes in the environment.

Disappearance of the lake means transfer of fertile lands into deserts, appearance of large territories of saline lands, drying shores of river, water reservoirs and the delta of Ili river which is a fodder base for cattle and fish, and a dwelling place for fauna. There will be violation of balance in all ecosystems with all corresponding environmental consequences and cataclysms.

The previously performed studies[1] revealed that the lake level below 341 m. of the Baltic system (BS) is critical, and its further decline is fraught with irreversible dry-outs, division into separate reaches with salt brine, or complete disappearance of the Lake as an integrated reservoir.

The disappearance of the lake means the conversion of fertile lands into deserts, the emergence of huge areas of salt marshes, desiccation of coastal rivers, reservoirs and Ili delta, which is fodder for animal husbandry, fish spawning, and the abode of wildlife. The lake's disappearance will cause disruption of the equilibrium in ecosystems with all the attendant environmental and social impacts .

Earlier, through the orders of the Government of Kazakhstan with the support of the European Union, The Institute of Geography, Kazgiprovodkhoz, CAREC and other organizations have conducted a number of studies and programs on IBB and BAB (some of these works are in the list of references), but practical and effective measures to reduce water losses have not been adopted. One of the reasons for this situation is too broadly defined goals, as well as the complexity of the proposed measures within the existing system of governance.

<u>The purpose of the Plan</u> is the development of target indicators and key lines of action for the conservation of Lake Balkhash, with an emphasis on internal resources.

Lake Balkhash is not just a regional reservoir, but it is also a universal heritage, legacy for the future generations. The ecosystem of Lake Balkhash is the largest lake ecosystem on the planet which makes a significant contribution to the ecological balance of the entire Eurasian region. It must not be destroyed, like the Aral Sea was.

3. The overall hydrologic situation.

BAB has a dense hydrological network. Basin water resources include numerous rivers, lakes, wetlands, ponds, artificial reservoirs, groundwater, glaciers, irrigation main canals and waterways. These resources are characterized by large interannual variability, alternations of low water and high-water years.

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[1] Enactment by the Ministers Cabinet of the Republic of Kazakhstan from 12.05.1992 No. 423 "About measures of addressing environmental problems IBB."

Because of climatic conditions, up to 70% of the annual runoff of mountain rivers is formed in the summer. Distribution of runoff over the basin is also uneven. The volume of BAB runoff, two thirds of which is formed on the territory of China, has ranged from 18 to 31 km^3 at average for the past 20 years. 11 to 26 km^3 of water goes to Balkhash Lake annually, which is for the most part naturally evaporated. Around 5 km^3 (excluding the losses in China) is used mainly for irrigation of crops and water supply, as well as for the maintenance of riverine riparian woodlands and riparian meadows.

During the 150 year-cycle, the level of the lake in a natural state varied periodically from a minimum of 340.5 in 1880 to a maximum of 343.71 in 1909 (Long-term dynamics of the flow is given in Appendix 2). However, in recent years, environmental well-being of the lake has become increasingly vulnerable to human activities.

In the second half of last century, economic activities related to irrigation and land development were carried out without regard for environmental capacity, and was accompanied by significant violations of the natural river regime. Prior to controlling Ili's runoff, the lake level varied cyclically, mainly between the marks 341.5 - 342.5 m. During the filling of the Kapshagay reservoir, the level had been gradually falling for 5 years continuously and always kept below 341 m.. Water decrease related to the construction of this hydroelectric station lasted 13 years. From 1984 to 2008, the Lake was in a state of transgression. One factor that contributed to this was the decline of economic activity in the post-Soviet period which led to reduced intake of water: 6.75 km^3 in 1989 to 3.61 km^3in 2009.

4. Main factors that determine the well-being of the lake

4.1 Zone of runoff formation

According to hydrological conditions, the basin can be divided into two regions - the mountainous region, or the zone of runoff formation, and the plain region or the runoff loss and dispersion region. The IBB runoff formation region is characterized by mountains of the Northern Tien Shan and the Djungarian Alatau, separated by a vast Ili basin. Geological and hydrogeological conditions determine the close relationship of surface and groundwater. The latter is formed by intense infiltration of precipitation and meltwater. More than 80% of the runoff occurs in the first half of the year.

Mountain ecosystems of catchment areas are particularly vulnerable to human impacts and climate change. The region has over 60 active rock glaciers, an area of about 21.4 km^2. Geothermal studies of glaciers, conducted in the periods from 1974 to 1977 and from 1990 to 2006, suggest that the permafrost in the Tien Shan Mountains has undergone significant changes over the past 30 years. On average, the reduction in ice content was more than 32%, and the reduction in volume was about 37,5% between 1955 to 1999 in the six valleys that were observed. In the period from 1955 to 1999, the area of glaciers has decreased by an average of 32,6%, from 247 to 164 km^2. The volume of more than 160 glaciers has declined by more than 37%, from 10.7 to 6.7 km^3. The continuation of this trend could lead to a complete cessation of inflow to Lake Balkhash, especially in the summer.

Table 1. Long-term dynamics of the glaciers

Region, river basin	**The area of glaciers, km^2**	**The volume of ice on the glacier, km^3**	**Changes in the area each year (%)**			
			1955-1979	**1979- 1990**	**1990-1999**	**1955-1999**
S. Almatinka	**16.45**	**0.51**	**-22.8**	**-6.9**	**-37.6**	**-0.85**
B. Almatinka	**5.79**	**0.18**	**-15.9**	**-5.7**	**-34.5**	**-0.78**
Left Talgar	**48.35**	**2.23**	**-20.8**	**-1.2**	**-33.6**	**-0.76**
Turgen	**22.98**	**0.88**	**-15.0**	**-9.5**	**-36.5**	**-0.83**
Chon Aksu	**32.2**	**1.48**	**-11.8**	**-38.2**		
Upper Chon Kemin	**164.39**	**1.39**	**-7.8**	**-9.3**		
Average		**6.67**		**32.6**		

4.2 Impact of climate change

Most of the predictive models of possible changes in water resources for the near future is based on the changes in the flow formation zone as a result of climate change. According to the estimates provided by the climate change studies[2], the major water basins in Kazakhstan may shrink by at least 20-22%, the number of dry years may increase dramatically, and grain yields may decline by 20-23%. Obviously, such changes will have very serious consequences for the future development of the country and will require urgent actions to adapt economic activities to climate change, particularly in the agricultural sector.

Table 2. The forecast volume of glaciers in the IBB

Region, river basin	**The volume of ice glaciers, km^3**					
	2000	**2010**	**2020**	**2030**	**2040**	**2050**
Kazakhstan part of Ili river basin	35.04	32.91	30.08	27.50	25.14	22.99
Chinese part of the Ili river basin	90.41	87.32	79.83	72.98	66.72	60.99
Total	125.45	120.23	109.91	100.48	91.86	82.98

[2] National Report on RKIIK, Kazakhstan, 2008

4.3 Water withdrawal in China in the upper river Ili

Environmental sustainability of Lake Balkhash is largely dependent on the water supplied from the territory of China. According to experts, increased water intake from river Ili in China will result in the shallowing and salinization of Lake Balkhash, which in turn will have serious socio-economic consequences. In China, in the upper river Ili, some major irrigation works have been built and continue to be built. The total area of irrigated land in BAB equals more than 580 thousand hectares. However, Lake Balkhash is not as sensitive to the use of water in the upper reaches as it is to a possible diversion of the runoff into the downstream areas of China, where demand for water and the potential for irrigation is many times greater than in the upper river.

Appendix 3. Map of the Upper River Ili.

Additional water withdrawals by the PRC during the dry years will, no doubt, dramatically reduce the amount of runoff into the lake. According to preliminary estimates, the reduction in runoff in the next 5-7 years may be at least 5 km^3.

Currently, water relations with China are built around "The agreement on cooperation in the use and protection of transboundary rivers" signed in 2001, which has absolutely no restrictions for PRC to withdraw water from the river (Appendix 4). Thus, the Agreement needs to be revised to take into account the new factors such as climate change, results of the latest international research, obligations and commitments to conservation of ecosystems and environmental sustainability adopted by all countries. In addition, when addressing transboundary water issues, the existing regional economic and environmental programs and political tools are not used for the full capacity. For example, Kyrgyzstan has a stake in the IBB and other watercourses shared with China. Moreover, opportunities are not used for more effective cooperation and beneficial use of water resources, such as the development of shipping and transportation of goods to Europe, fishing, small hydropower, ecotourism and others.

4.4 Water losses in the agricultural sector

IBB has a large area of irrigated lands - 653 ha, of which less than 10% (51,3 thousand hectares) are equipped with collector-drainage networks. The absence of an effective drainage system leads to an increase in groundwater levels and, as a consequence, to the salinization, flooding and waterlogging of soils, as well as lower yields and unsuitability of lands for crops . Practically all the irrigation systems, with the exception of the Big Almaty Canal and the Shingeldinsky array, have earthen riverbeds with the efficiency of 0,4-0,5, which means that more than 50% of water loss. However, in recent years the technical condition of all other water facilities, including the Bartogai dam, Curtin reservoir, Askutan dam, Tasmurun and Akdala main canals, and Talgar, Kaskelen hydropower facilities, has drastically worsened. Collector-drainage networks are in poor condition.. According to the district irrigation administration responsible for implementing the practical operation of irrigation systems and water supply, only 1 m^3 out of every 2 m^3 of water reaches the field through the irrigation canals, in other words half of the water is lost. **Water losses in damaged irrigation systems account for over 2.5 km^3** of water from the general resources of Lake Balkhash.

The main directions for water saving in agriculture may be as follows:

- Existing irrigation standards, according to which watering limits are calculated, do not correspond to the real needs of plants in the moisture necessary for vegetation. Calculations show that the existing rules and the actual supply of water exceed the needs of most of the crops (rice, alfalfa) more than two times. **The irrigation standards should be reviewed to reduce excessive watering.**
- A key policy instrument for water supply is tariffs. The cost of water, ideally, should compensate for all expenses for the operation and maintenance of networks, but for now, at least, it should be used to stimulate water conservation. The tariffs ranging from 0,048 to 0,3 tenge /m^3 of water which are set annually by the antimonopoly agency do not provide enough funds for maintaince of irrigation systems and water savings. According to experts, it is necessary **to raise rates to 2,5 - 3** tenges / m^3 -to the level that creates incentives for saving water and ensuring more or less normal operation of irrigation systems. This tariff will stimulate not only water saving but also private sector investment in infrastructure and new technologies. However, tariff increases should be accompanied by support from the State to rehabilitate and upgrade irrigation infrastructure by means of organizational and legal support measures.
- Water loss during transport over networks need to be reduced. Given the fact that the main losses happen due to the faulty networks, by renovating them and improving their waterpoofness, the efficiency of systems can be improved from 0,4-0,5 to 0,7-0,9. We must **introduce new technology:** drip irrigation, ridge planting of crops, combined with irrigation through furrows. The biggest saving can be achieved by drip irrigation for fruit plantations planted in wide rows. The cost of water with this technology can be reduced in 1,5-2 times compared to surface irrigation. It is also necessary to restore a more efficient sprinkler irrigation system (previously it was applied to an area of 100 ha).
- Rice culturing is the most water-intensive one. **Replacing the rice crop rotation with dry feed production systems** gives no less income for farmers while reducing the consumption of water several times. (A comparative table of the replacement of rice is given in Annex 5).

4.5 Seepage losses in riverbeds and in areas of flow dispersal

After leaving the mountains, the rivers pass through the powerful fans of piedmont plain, composed mainly of boulders and gravel-pebble deposits with reservoir capacity greater than 150 m and with a large coefficient of filtration and high permeability. Further below, these waters peter out at the surface and form swamps, marshes, small rivers. These losses are not well understood, and by conducting the necessary research they can be accurately determined. But their volume is not significant and could reach **up to 4 km^3.**

4.6 The losses in the river deltas

Deltas frame a unified system with the rivers and are an essential part of them. However, at the exists to the lake, holdups and obstructions are formed, due to which water takes up new territory and filters through the sandy soil and gets lost. The losses in the Ili delta reach **4 km^3** / year, in the Aksu delta - up to 100 million m^3. The possibility to reduce losses due to excessive water filtration in the deltas requires additional study and related engineering activities for dredging and clearing congestions. Part of the volume of the above losses can also be added in the total turnover of water. This will require some research (similar to studies in the delta of Syr Darya[3].

4.7 Kapshagay HES and Kerbulak Counterregulator

The fact that the energy compensating hydroelectric station on the river Ili remains incomplete is the reason for the low effectiveness of Kapshagay HES, which leads to uneven water discharges that adversely affect the condition of delta systems of Ili River. This leads to substantial economic losses and environmental damage.

Therefore, the projected construction of Kerbulak HES[4] will help to smooth uneven water discharges and to improve seasonal regulation, which will bring the water regime in the downstream to the natural environmental flows, and allow to exploit Kapshagay HES more efficiently. The location of the projected Kerbulak[5] HES, as the final element of energy-compensating system, is supposed to be in the middle flow of Ili - 23 km down the Kapshagay HES.

4.8 Water use in industry and thermal power generation

Manufacturing faults play a significant role in determining the welfare of the lake. Pollution of Lake Balkhash is generally described by the following data: chlorides exceed MPC in 80% of the samples, sulfate and copper in 100%, zinc in 25%, fluorides in 98%, petroleum products in 40%, and phenols in 33% of the samples. There is a constant excess from standards: for example, during the tests in 2008 it was found that in the Ili River and its tributaries, the

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[3] Kipshakbayev N.K., "Restoring the ecological system of the Syr Darya delta and Northern Aral Sea, Kazakhstan, "Evero", 2010

[4] Engineering of the Kerbulak GES is performed in accordance with the Enactment of Government of the Republic of Kazakhstan № 384 of 09.04.1999 "On the program of power sector development until 2030 and the Action Plan on the development of power industry of the Republic of Kazakhstan (MEMR, February 2007).

[5] Pre-EIA for PredTEO Kerbulak HPP on river Ili, LLP KAZGIDRO.

concentrations of copper 12 times exceeded the standards, iron 2,8 times, nitrite 1,8 times. Water resources are contaminated by thousands of small and large businesses located along the rivers. One of the largest polluters is the mining and metallurgical plant JSC Balhashmys. On the surface of the bays of the lake, adjacent to the town of Balkhash, 76 tons of copper, 77 tons of arsenic, 66 tons of lead and 68 tons of zinc and 37 tons of titanium, 7 tons of manganese accumulate annually.

In recent years, the volume of discharges and emissions has increased, the lake continues to be polluted by the industries, including accidental releases, municipal and agricultural effluents. Concentrations of zinc, copper, nickel and cadmium in the water of Ili exceed safety standards many times. There should be a **full cessation of discharging polluted effluents** into the lake and into the natural environment. All industrial and energy facilities have to adopt technologies with a complete cycle of wastewater treatment and reuse. Implementing the recommendations of the project of the European Commission to adopt international standards for water quality and to implement best available technologies and MPAE (maximum permissible adverse effects) standards [5], approved in 2008 by Water Resources Committee together with the MEP, would greatly help in improving water quality and streamlining the permitting system for water abstraction and discharges. In the future, all industrial production of "Balhashmys" and others, built during the years of World War II, should be withdrawn from the vulnerable regions around Lake Balkhash.

4.9 Municipal water consumption

Water losses in water supply networks of cities and villages range from 30 to 70%. Deterioration of urban water supply networks reached 70%, resulting in accidents and interruptions in water supply, large leaks in the network, reaching 30% or more. In Almaty, the largest city in Kazakhstan, the loss of water since 1996 has increased for 40%.

In rural areas the length of water networks is over 2214 km, 70-80% of which is worn out. Some municipalities, as well as parts of the urban territories have no sewage system. Waste water is discharged into special storage which leaves the possibility of leakage of the polluted effluents into the rivers. The reduction of unproductive losses through the adoption of utility programs on water conservation and cessation of the use of potable water for technical needs **can give Balkhash additional 125 million m^3 of water annually,** and ensure more sustainable water supply of populated areas**.** These public programs could also have a significant result in saving the water needed to dilute the dirty sewage.

In general, the water volume of the above reserves of the basin could comprise up to 6 km^3, which makes it possible to maintain a guaranteed run-off, required for a stable regime of

Lake Balkhash at the mark not less than 341 m. in order to save all the life activity throughout the basin.

Table 3. Possible volumes of water saving in the IBB

Sources of water saving for Lake Balkhash	Volume (km ^{3}/)	Scheme of use
Drainage water	Up to 0,5	Discharge water flows
Collector-drainage water	Up to 0,5	Discharge water flows
Substitution of rice with less water-intensive crops	0.5	Reduces intake from surface flow
Losses in irrigation systems due to exceeding the watering norms and due to worn-out networks *	Up to 3,4	Reduce intake from surface flow
The losses in the runoff dispersion areas and river channels	Up to 1,0	Refilling of surface flow
Other losses (in the Delta of Ayagoz River, flooding and water logging)	Up to 0,5	Refilling of surface flow
Total	6.4	

* In 2009, according to official data, the water intake was 3249.6, and the supply of water to the fields was 2563.5 m ^{3}. However, the actual intake was 2 times greater - about 5127 m ^{3}. When the efficiency of 0,8 is achieved and the average irrigation standard of 3000 m ^{3}/ ha is established, the required intake will be no more than 3750 m ^{3}/ ha. In other words, for 461.6 hectares of land watered in 2009 only 1731 million m ^{3} would be required instead of the current 5127 m ^{3}. Thus, possible water savings will amount to 3396 million m ^{3}.

4.10 Management

The Implementation of the above proposed activities for the conservation of the lake and for the sustainable development of the basin in the existing system of governance is unlikely. Poor management of the environmental, water and other resources in the basin is the main cause of environmental, social and economic problems. It is fragmental, sectoral, and based on short-term and group interests, which creates an environment in which a thousand different business entities shape and implement their economic programs without considering water saving and the limited capacity of natural ecosystems. Quality and quantity management issues, surface and underground water system planning and economic incentives, government control, accounting, statistics and other tools of environmental management **in practice do not support the goals of saving water and the preservation of Lake Balkhash.**

The existing system of relations in the basin, dominated by low-profit agriculture with high operating costs and energy-intensive production, is unattractive to investors to introduce new technologies and upgrade equipment. Almost half of ploughed fields in the basin are located on irrigated land, requiring significant engineering services and high costs of electricity. Pastures also require specific actions as the pre-existing system of irrigation has changed, which caused a sharp decline in livestock numbers. The region is poor with electricity, the establishment of power generation based on more secure and advanced technologies of renewable energy. Local energy resources also requires special conditions and "green" investments. Rehabilitation of the lost natural potential, filling river deltas with water, cleaning their beds from pollution, water conservation and protection of water resources will require substantial capital investment with return prospects in the distant future.

Therefore, for the implementation of the Plan, the integrated actions by state institutions and economic entities on the basis of common goals and the creation of special provisions for additional investment and new technologies are needed. Our earlier experience[6] has showed that such a management system for the conservation of ecosystems of Lake Balkhash is possible through **government-private partnership:** the creation of private-state corporation "Lake Balkhash". It is also important to use the experience of Kazakhstan in creating SPCs, public-private funds, and others.

The recommended control scheme provides a socially and environmentally responsible, self-sustaining and self-regulating system based on clear targets and on the partnership of state, private and public sectors, with the participation of international organizations that can bring their experience, confidence and that can act as the guarantor for the foreign investments and commitments of various parties.

It is reasonable that the following is given to the property of the Corporation: water resources, including groundwater, non-privatized and unused irrigated land, pastures and grasslands, agricultural and communal water supply facilities, hydropower and environmentally oriented activities (eco-tourism, recreation, fish farming, renewable energy, transport services, including navigation on the Ili River). Thus, the basin management by the Corporation will present a complete cycle required to implement this Plan and effectively address the complex socio-economic and environmental problems (approximate structure of integrated management is presented in Appendix 6).

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[6] The concept of sustainable development of the Ili-Balkhash basin, approved by the Committee of Ecology and Nature under Majilis of RK and approved by the MEP of RK

4. Indicators of the Lake Balkhash Conservation Plan

In order to implement the Plan and preserve the Lake Balkhash, the following target indicators are proposed:

Key Indicators

1. The level of Lake Balkhash is kept at a mark not less than 341m BS - an integrated indicator of the sustainability of ecosystems and environmental well-being throughout the basin
2. Signing an agreement with China that will ensure consistent supply of water not less than 12 km^3 in the IBB. Such an agreement should have a detailed information on the seasonal water supply and water quality.
3. Guaranteed volume of surface runoff in the basin - not less than 25 km^3
4. Guaranteed seasonal discharges to the deltas of the lake - not less than 12 km^3 / year

Supporting indicators

5. Tariffs for irrigation water should not be less than 3 tenges/m3 (this will stimulate water saving and reducing water wastage, as well as investments in new technologies and infrastructure)
6. Efficiency of irrigation systems should be improved up to 0,7-0,9 (instead of today's 0,4-0,5) – by means of installing waterproof screens and water transporting pipes
7. Approved reduced water use standards - more stringent than the current - not less than 2 times for certain crops (rice, alfalfa, etc.)
8. Substitution of rice with fodder crops and other cultures in the area not less than 45 thousand hectares
9. A complete cessation of industrial discharges by JSC "Balhashmys " and other industrial and agricultural producers into the lake and the environment
10. Adoption of the government plan for transition to the new classification of water bodies and water quality standards based on EU Water Framework Directive 2008/105/EC KAUs and introduction of MPAE standards as the first stage

11. The development, approval and implementation of utility programs by city akimats to save water and reduce water consumption, including in the city of Almaty - from 500 to 200 liters / day / person.
12. Construction of the Kerbulak Counterregulator for smoothing uneven technological releases from the Kapshagai HES to achieve the natural regime at the deltas of the lake
13. Creating a unified and integrated database on the quantity and quality of water in the basin available to all governments, water users and the general public and working in real time
14. Regular meetings of the Balkhash-Alakol Basin Council that makes decisions and gives recommendations on the distribution of water and that has its own financial and technical base
15. Creating a state-private partnership and an International Basin Corporation - a body of integrated management of water, land, environmental and other issues in the basin as a prerequisite for the implementation of the Plan

The general scheme of the plan is in Appendix 7.

5. Conclusion

Reduction in the water flow volume into the Lake Balkhash due to the excessive intake in China, as well as climate change, can be compensated by interrelated measures on refilling the lake with water by saving water and reducing water loss, by the introduction of new technologies and by creating a more efficient management system.

As a result of implementing the Plan, the Balkhash Lake, as a national asset, will not disappear from surface of the planet, unlike the Aral Sea did. The population living in the basin will be ensured to have a more stable (long-term, safe and environment-friendly) activities. The state will in turn strengthen its ecologic and food safety and will make a significant contribution to achieving global development goals and environmental sustainability.

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Applications

Appendix 1. Map of Ili-Balkhash basin

Appendix 2. Long-term dynamics of the runoff of River Ili

Annex 3. Satellite image of the upper river Ili

Annex 4. Article 4 The Agreement on cooperation in the use and protection of transboundary rivers between PRC and the RK

Annex 5. Comparative table of indicators under rice substitution

Annex 6. The approximate scheme of integrated management of BAB

Annex 7. The overall scheme of the Plan

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