

Appendix A-21

**PROBLEMS OF REGULATION, MANAGEMENT AND
CONSERVATION OF WATER RESOURCES OF THE
TRANSBOUNDARY SYR DARYA RIVER
(ELABORATING OF THE POSITION OF THE
REPUBLIC OF KAZAKHSTAN)**

Prepared by:
Sharybzhhan. Nadyrov, Alexei Rau, and Igor Malkovsky

1999

Prepared for:
Central Asia Mission
U. S. Agency for International Development

Environmental Policy and Institutional Strengthening Indefinite Quantity Contract (EPIQ)
Partners: International Resources Group, Winrock International, and Harvard Institute for International Development
Subcontractors: PADCO; Management Systems International; and Development Alternatives, Inc.
Collaborating Institutions: Center for Naval Analysis Corporation; Conservation International;
KBN Engineering and Applied Sciences, Inc.; Keller-Bliesner Engineering; Resource Management International, Inc.;
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CHAPTER 1. LEGAL ASPECTS OF INTERSTATE RELATIONS ON JOINT USE OF WATER RESOURCES

1.1 Review of Acting Water Legislation of the Republic of Kazakhstan

Following proclamation of the country's sovereignty, the Supreme Soviet of the Republic of Kazakhstan adopted the Water Code on March 31, 1993.

The fundamental subordinate acts of the normative character on the water relations adopted by the Government of the Republic of Kazakhstan are as follows (in the chronological order):

- Enactment # 930 of August 19, 1994 of the Cabinet of Ministers of the Republic of Kazakhstan *On Procedure of Water Use for Fire-Fighting Needs*;
- Enactment # 931 of August 19, 1994 of the Cabinet of Ministers of the Republic of Kazakhstan *On Procedure of Assigning the Waterways to the Category of Sea Routes*;
- Enactment # 932 of August 19, 1994 of the Cabinet of Ministers of the Republic of Kazakhstan *On Approving the Procedure of Development and Confirmation Of the Multipurpose Water-Resources Use and Conservation Schemes*;
- Enactment # 1482 of December 29, 1994 of the Cabinet of Ministers of the Republic of Kazakhstan *On Approving the Procedure of Coordination and Granting Permissions for Special Water Use*;
- Enactment # 1483 of December 29, 1994 of the Cabinet of Ministers of the Republic of Kazakhstan *On Approving the Instruction on Procedure Concerning the Placing of Water Bodies for Solitary Use*;
- Enactment # 1491 of December 30, 1994 of the Cabinet of Ministers of the Republic of Kazakhstan *On Procedure of Using the Water Bodies for the Air Transport Needs*;
- Enactment # 75 of January 24, 1995 of the Cabinet of Ministers of the Republic of Kazakhstan *On Approving the Procedure of Keeping the State Water Cadastre*;
- Enactment # 95 of January 26, 1995 of the Cabinet of Minister of the Republic of Kazakhstan *On Approving the List of Water Bodies of the Republican Significance (Underground Waters) for the Health-Improvement Purposes*;
- Enactment # 102 of January 27, 1995 of the Cabinet of Ministers of the Republic of Kazakhstan *On Approving the Regulations on the Water Protection Zones and Belts*;
- Enactment # 160 of February 15, 1995 of the Cabinet of Ministers of the Republic of Kazakhstan *On Approving the Regulations on Procedure of the State Registration of the Water Resources and Their Use*;
- Enactment # 218 of March 3, 1995 of the Cabinet of Ministers of the Republic of Kazakhstan *On Approving the List of the Water Bodies of Special State Significance or Particular Scientific Value the Granting of Which in Use May be Restricted or Completely Prohibited*;
- Enactment # 600 of 29 April, 1995 of the Cabinet of Ministers of the Republic of Kazakhstan *On Approving the Regulations on the State Control Over the Water Resources Use and Conservation*.

Subsequently, the Law of the Republic of Kazakhstan was adopted on December 24, 1996 *On Inserting Amendments and Addenda into the Water Code of the Republic of Kazakhstan*. In conformity with this Law the Enactment # 1744 was adopted on December 31,

1996 by the Government of the Republic of Kazakhstan *On Establishing Charges for the Water Resources Diverted from the Surface and Underground Sources*. This document was recognized invalid in the context of issuing the Enactment # 1227 of 7 August, 1997 of the Government of the Republic of Kazakhstan *On Approving the Regulations on Procedure for Calculating, Collecting and Paying Charges for Use of the Water Resources from the Surface Sources by the Branches of Economy of the Republic of Kazakhstan*.

Without going into detailed analysis, it should be noted that the Water Code of the Republic of Kazakhstan (1993) inherited as a whole the principles of the water relations of the former Soviet Union. That is, they are socialist by their essence, and the Code is conceptually the non-market one, and it doesn't meet the present-day realities.

In the Section *General Provisions* of the Water Code the issues of the water relation objects are framed unclear. And in the Code of the Republic of Kazakhstan itself the *water object* concept has not been revealed. It remains vague what the water objects present by themselves, in particular, the surface-stream flows and water reservoirs on them. This is essential since to the surface-stream flows there are assigned the rivers and water reservoirs on them, channels of the interbasin redistribution and multipurpose use of the water resources.

There is no definition for transboundary (boundary) water objects which identify, cross the boundary between the foreign states or along which the State boundary of the Republic of Kazakhstan passes.

The matters of property and other rights to water have been specified poorly. It is not indicated what rights legal entities and physical persons may have not being the owners of the waters including the right of limited use (public and private water servitudes). The rule of law for acquiring and cessation of the right to use the waters including those on the part of water use licenses and executive licenses have been stated not quite completely.

The legal rules concerning the competence of the state authority bodies in the area of the water relations regulation incompletely conform to the legislation of the Republic of Kazakhstan. The spheres of the state management as to the waters use and conservation are not precisely differentiated and not regulated.

In Section *the Water Use* there is not provided very important moment - obligatoriness of concluding agreements on the waters use. Such agreements may deal with the long-term and short-term use, and the private water servitude. In this Section there are not taken into account the problems of the rate-fixing and standardization which include setting of limits in water use (water consumption and water diversion), standards, norms and rules for the water use and conservation. Apart from the general and special water use there may be also the specific water use that may be of importance for transboundary (boundary) water objects.

In this Section there is the Chapter concerning payments for the water resources use but it doesn't reveal the basic principles of economic regulating and stimulating the rational use, restoration and conservation of the water objects.

The payments to be forwarded for restoration and conservation of the water objects have not been specified. There are not stipulated any privileges by payments related to the waters use.

In Section *Water Conservation and Prevention from the Adverse Effect* the general requirements are missed, and special requirements are framed incompletely, for example, standards for location, designing, construction, reconstruction and commissioning of economic

and other projects influencing the water resources condition, norms of maximum permissible adverse impacts on the water resources, requirements to ecological releases (discharges of water from reservoirs), by extreme ecological situations and ecological disaster zones on the water objects. There are not stipulated the water basin agreements on the water conservation as well as particularities of conservation of transboundary (boundary) water objects.

It should be also noted that in the Republic of Kazakhstan the civil law liability has not been established for separate types of violation of the water legislation, especially for non-rational use of the water resources. As a consequence considerable amounts of the money resources don't enter the republican and local budgets.

It is not feasible to make the radical reform of the water relations complying with the market economy on the basis of the Water Code (1993) of the Republic of Kazakhstan. This Code doesn't allow solving on the legal base the problems of use, reproduction and conservation of transboundary (boundary) water objects.

1.2 Scientific and Practical Analysis of International Acts

1.2.1 General Considerations

The premise resides in the fact that the Syr Darya River presents, from juridical point of view, a transboundary water object the basin of which is located on the territories of four Central Asian states: the Republic of Tajikistan, the Kyrgyz Republic, the Republic of Uzbekistan and the Republic of Kazakhstan. The River has the regulated flow, and the principal regulating hydrosystems are located in the Republic of Tajikistan (the Kairakkum hydrosystem), the Kyrgyz Republic (the Toktogul hydraulic works) and in the Republic of Kazakhstan (the Chardara hydraulic scheme).

A special feature of the Syr Darya River as a transboundary water object resides in significance of its flow, along with the Amu Darya River flow, for rehabilitation of the Aral Sea. From the international point of view, this aspect is considered as a more priority one inasmuch as the Aral Sea crisis is recognized by the world community to be the global problem.

The International Treaties ratified by the Republic of Kazakhstan have priority against the Republic's laws and should be applied directly except the cases when it follows from the international treaty that for its application a special law should be issued.

1.2.2 Acts Concerning the Aral Sea and the Aral Sea Basin

Based upon the top priority, let's at first consider briefly and in the chronological order the international acts concerning the problems of the Aral Sea and its Basin.

To clarify how were developing approaches for solving the Aral Sea crisis, it should be pointed to the last during the existence of the Soviet Union Decree # 1110 of September 19, 1988 of the CPSU Central Committee and the Council of Minister of the USSR *On the Measures for Radical Improving of Ecological and Sanitary Situation in the Region of the Aral Sea, Enhancing of Efficiency in Use and Strengthening Protection of the Water and Land Resources in its Basin.*

In the aforesaid Decree of the Central Committee of the CPSU and the Council of Ministers of the USSR there were set the following goals being of interest for this Review that subsequently became the competence of new independent Central Asian States:

- To specify the firm inflow of the rivers water to the deltas of the Amu Darya and Syr Darya Rivers and to the Aral Sea beginning since 1990 in the volume at least 8.7 cu. kilometers per year and increasing it up to 11 cu. kilometers in 1995, by the year of 2000: up to 15 – 17 cu. kilometers, and by 2005: up to 20 – 21 cu. kilometers (considering collector and drainage waters);
- The concerned Ministries, Departments and Councils of Ministers of the Union Republics should develop and submit in 1999 for approval the scheme of the multipurpose use and conservation of water and land resources of the Aral Sea Basin up to 2010. On the basis of this scheme the respective Ministries should specify the volumes of the water required every year to be delivered to the Aral Sea, and with consideration for this to bring to the Councils of Ministers of the Union Republics notice the limits on the water use for irrigation and economic needs from the basins of the Amu Darya and Syr Darya Rivers.

Later on, in conformity with the Decree of the Council of Ministers of the USSR

1185 of November 24, 1990 *On Founding of the Union-Republican Consortium Aral* it was supposed to establish the mentioned Consortium entrusting it with the function of the single customer on taking the package of actions in improving ecological, sanitary and epidemiological situation, and living conditions for the population in the Aral Sea Basin.

Dissolution of the Soviet Union discontinued the works contemplated in regard to the Aral Sea and its Basin, but continuity of approaches in these problems solving was preserved. At first, each independent Central Asian State tried to solve these challenges on their own starting from the potentialities available.

According to the Enactment of the Supreme Soviet of the Republic of Kazakhstan of April 18, 1992 *On the Urgent Measures for Radical Reformation of the Living Conditions of Population in the Aral Sea Region* there were declared as zones of ecological disaster the whole Kzyl-Orda Oblast and the town of Kzyl-Orda, several districts of Aktyubinsk, Dzhezkazgan and Dzhabul Oblasts. To implement this enactment, there was adopted the Enactment # 280 of March 25, 1992 of the Cabinet of Ministers of the Republic of Kazakhstan *On the Urgent Measures for Improving the Social, Economic and Ecological Conditions of the Population Residing in the Aral Sea Region*. It was stipulated by this Enactment to finalize and submit for consideration to the Cabinet of Ministers of the Republic of Kazakhstan the government program on saving the Aral Sea and restoration of the ecological equilibrium in the Aral Sea Region for the period ending in 2006 (“Aral – 2006” Program), to make initial organizational actions, to assign respective material and technical resources and to ensure commissioning in 1992-1993 of the capacities of the social and production purposes in the Aral Sea Region.

On June 30, 1992 the Supreme Soviet of the Republic of Kazakhstan adopted the Law of the Republic of Kazakhstan *On Social Protection of the Citizens Suffered in Consequence of Ecological Disaster in the Aral Sea Region*, and the Cabinet of Ministers of the Republic of Kazakhstan specified the measures for realization of this law by its Enactment # 1057 of December 17, 1992.

Subsequently the supreme authority bodies of the Republic of Kazakhstan ran into certain financial and material-and-technical obstacles. As the result of it, the Law of the

Republic of Kazakhstan of June 30, 1992 and the Enactments of the Cabinet of Ministers of the Republic of Kazakhstan # 280 of March 25, 1992 and #1057 of December 17, 1992 were implemented incompletely. The State Program on the Aral Sea saving and restoration of the ecological equilibrium in the Aral Sea Region ending in 2006 (“Aral – 2006”) was not validated.

The range of the required actions, their disproportionately great outlays and necessity in joint solution of the problems on saving the Aral Sea – all this prompted the Central Asian States to develop international cooperation and to apply to the world community for assistance.

On February 18, 1992 in the City of Almaty there was adopted the Agreement Berwyn the Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Uzbekistan and Turkmenistan on cooperation in the sphere of joint management of use and conservation of the water resources of the interstate sources. This Agreement conceptually was not the intergovernmental treaty but the interdepartmental one. But it has played a certain role as the first step in the interstate regulation of the issues in the water delivery to the Aral Sea and Aral Sea Region.

On April 6, 1992 in the City of Ashgabat by the decision of the Interstate Coordination Water Commission of the Central Asian Republics, Kazakhstan and Turkmenistan there was approved the Charter of the Basin Water Organizations *Amu Darya* and *Syr Darya*.

On December 5, 1992 in the City of Bishkek at the level of Ministers and Administrators of the central executive bodies of the Central Asian states there was taken the decision on establishing of the Interstate Coordination Water Commission of the Central Asia.

On January 4, 1993 in Tashkent at the meeting of the Heads of the Central Asian states the decision was taken on establishing the International Fund for the Aral Sea.

In addition, at the level of Presidents of the Republic of Kazakhstan, the Kyrgyz Republic, Turkmenistan, the Republic of Tajikistan and the Republic of Uzbekistan the Agreement was executed in the town of Kzyl-Orda on March 26, 1993 on the joint actions for solving the problems of the Aral Sea and Aral Sea Region, for ecological sanitation and ensuring the social and economic development of the Aral Sea Region. At that time Presidents of the Central Asian States approved The Provisions of the International Fund for the Aral Sea; the Republic of Kazakhstan ratified these Provisions in accordance with the enactment of the Supreme Soviet of the Republic of Kazakhstan of October 19, 1993 *On Ratifying the Provisions of the International Fund for the Aral Sea*.

On January 11, 1994 in the town of Nukus the Heads of the Central Asian States and Government of the Russian Federation arrived at the decision in conformity with which there were approved basic provisions of the Concept for solving the problems of the Aral Sea and Aral Sea Region considering social and economic development of the region, and there was confirmed the Program of concrete actions on improving the ecological situation in the Aral Sea Basin for the nearest 3 – 5 years taking into account social and economic development of the region (Principle Provisions).

The most of the clauses in the Program of concrete actions for solving the problems of the Aral Sea and Aral Sea Region for the nearest 3 – 5 years taking into account social and economic development (Principle Provisions) have not been fulfilled, among these points is the development of general strategy for the water sharing, rational water use and conservation of water resources in the Aral Sea Basin as well as the drawing up on this strategy’s basis of the drafts of interstate legal and normative acts regulating the issues of the joint use and protection

of the water resources from pollution considering social and economic development of the region.

At the same time, on January 11, 1994 in Nukus the Heads of the Central Asian States confirmed the Provisions of the Interstate Council for Addressing the Aral Sea Crisis.

On September 20, 1995 in Nukus at the UN International Conference on Sustainable Development of the Aral Sea Basin, Presidents of the Central Asian states adopted the Nukus Declaration of the Central Asian States and International Agencies on the Problems of Sustainable Development of the Aral Sea Basin.

Presidents of the Central Asian states advanced the proposal on the necessity of establishing the International Convention on Sustainable Development of the Aral Sea Basin where the issues of the joint water use and unification of the ecological standards should take the priority position.

On February 28, 1997 at the meeting in Almaty the Heads of the Central Asian states approved the principle management scheme proposed by N.A. Nazarbayev, President of the Republic of Kazakhstan, and arrived at the decision on reorganization of the structure of the International Fund for the Aral Sea.

At that time Presidents of the Central Asian states adopted the Almaty Declaration in which they appealed to the United Nations Organization and its specialized agencies to pay close attention to the developed crisis situation in the Aral Sea Basin and to take effective measures for the environment protection in this region. Presidents also

stated about necessity to complete together with international agencies the elaboration of the Convention on Sustainable Development of the Aral Sea Basin.

On March 29, 1997 the Agreement concerning the status of the International Fund for the Aral Sea and of its agencies was concluded between the Governments of the Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Tajikistan, the Turkmenistan and the Republic of Uzbekistan.

On the part of the Government of the Republic of Kazakhstan these actions are not quite correct. At first it would be required to initiate forfeiture of the enactment of the Supreme Soviet of the Republic of Kazakhstan of October 19, 1993 *On Ratifying the Provisions of the International Fund for the Aral Sea* which is in force up to now.

On October 15 – 16, 1997 at the International Technical Meeting on the Challenges of the Aral Sea Basin with participation of all Central Asian states at the level of Vice-Prime Ministers and Ministers, representatives of international banks and foundations, the UN missions and agencies, nongovernmental and ecological institutions a special communiqué was adopted. In this document the participants of the meeting expressed their confidence that the strategy on the rational use of the Aral Sea Basin water resources will become the major priority for all states of the Central Asia.

In December of 1997 President of the International Fund for the Aral Sea Saving (IFAS), President of the Republic of Uzbekistan, approved the decision on commencement of working out the agreements for implementing the Project of the Global Environment Facility *Management of the Water Resources and Environment in the Aral Sea Basin*. On May 12, 1998 President of the IFAS took a special decision concerning the support of the project with the preliminary budget in the sum of \$20.89 mln. Of this amount the Global Environment Facility

should finance \$12.2 mln. (58,4%), the Central Asian states – \$3.2 mln. or 15.3%, the European Union – \$1.05 mln. or 5.1% and SADA (Sweden) – \$0.34 mln. or 1.6%. On June 21, 1998 the agreement was signed on the Grant between the Trust Fund of the Global Environment Facility, the Executive Committee of the International Fund for the Aral Sea and the International Bank for Reconstruction and Development.

On April 9, 1999 in Ashgabat Presidents of the Central Asian states adopted the Ashgabat Declaration where they noted that the regional project *Management of the Water Resources and Environment* under support of the Global Environment Facility is in the process of implementation and stated about ensuring all kind of assistance and support for the project realization. Along with it, in Declaration it is noted that the efforts being taken for solving the problems of the Aral Sea Basin are inadequate.

Summarizing the review and analysis of the Acts regarding the Aral Sea and its Basin over last ten years the following should be noted.

1. General principles and actions for overcoming the Aral Sea crisis were laid during the Soviet period, and they were best of all embodied in the Decree of the Central Committee of the CPSU and Council of Ministers of the USSR #1110 of September 19, 1988 *On Measures for Radical Improvement of Ecological and Sanitary and Epidemiological Situation in Aral Sea Region, for Enhancement of Effective Use and Strengthening of Conservation of the Water and Land Resources in the Aral Sea Basin*. But the target works ceased in connection with the Soviet Union dissolution.

2. New sovereign Central Asian states were forced to undertake burden of solving the problems of the Aral Sea and the Aral Sea Region taking at first (1990-1992) independent steps. Mechanically they were taken in the course planned by the Union authority bodies. The Republic of Kazakhstan which appeared to be in a particular fix may serve as an example of the developed situation: the adopted decisions of the republican representative and executive bodies not supported by financial resources proved to be unexecuted.

3. Since 1992 the position of the Central Asian states in overcoming the Aral Sea crisis became turning to the necessity of integrating the required actions. The first act in this context was the Agreement on Joint Actions for Solving the Problems of the Aral Sea and the Aral Sea Region, Ecological Sanitation and Ensuring Social and Economic Development of the Aral Sea Region executed by Presidents of Central Asian states on March 26, 1992 in the town of Kzyl-Orda.

In 1993 there was set up the International Fund for the Aral Sea, and in January 1994 there were confirmed the Provisions of the Interstate Council for Addressing the Aral Sea Crisis, that is, the modified under new conditions structures, similar to the Union-Republican Consortium *Aral* with its supreme body in the form of the Council with participation of the concerned Union Republics, were being legally formalized.

In 1994 the Heads of the Central Asian states and the Government of the Russian Federation approved the Concept for Solving the Problems of the Aral Sea and the Aral Sea Region Considering Social and Economic Development of the Region (General Provisions) and confirmed the Program of Concrete Actions for Improving the Ecological Situation in the Aral Sea Basin for the Nearest 3-5 Years Considering Social and Economic Development of the Region (General Provisions).

4. Even at the stage of rise and development of international cooperation on the problems of the Aral Sea and its Basin there became evident some discrepancies in certain interests of the Central Asian states particularly in the water resources sharing. The Government of the Russian Federation took part at the meeting of the Heads of the Central Asian states on January 11, 1994 in Nukus, and after adoption by them of the aforementioned Concepts and Programs of concrete actions in which the issue of transfer of a part of the water from Siberian rivers was withdrawn from the agenda finally, the Government of the RF no longer displayed noticeable interest in overcoming the Aral Sea crisis.

5. In 1995-1997 the organizational structure of the International Fund for the Aral Sea as a specialized interstate body was strengthening. Thus, there have been formed important legal and organizational prerequisites for implementing the measure of the interstate character.

6. The Heads of the Central Asian states in collaboration with the United Nations Organization performed a mission of great significance for drawing attention of the world community to the Aral Sea crisis. There played a certain role the UN International Conference on Sustainable Development of the Aral Sea Basin held on September 20, 1995 in Nukus and the adopted at the same time the Nukus Declaration of the Heads of the Central Asian states and international agencies On the Problems of Sustainable Development of the Aral Sea Basin. However up till now the decision on elaboration and adoption of the International Convention on Sustainable Development of the Aral Sea Basin has not been realized.

7. The actions for surmounting the Aral Sea crisis taken in the course of 1993-1999 by the Central Asian states owe to the initiatives of their Heads. But their Declaration and some decisions are the political statements by their nature, and they have no that kind of concreteness which is inherent in the international agreements being concluded on behalf of the States. Lack of the interstate and by a number of the problems of the intergovernmental and international agreements testifies that the international cooperation of the Central Asian states on the problems of the Aral Sea and the Aral Sea Region has not still reached the level required for effective decision of practical targets.

1.2.3 Acts Concerning the Syr Darya River

More than two tens of acts and statements concerning the use of the Syr Darya water resources were adopted during 1995-1999.

The statement of the Heads of the Republic of Kazakhstan, the Kyrgyz Republic and the Republic of Uzbekistan made on May 6, 1996 in Bishkek on the use of the water and power resources of the Syr Darya River was one of the most significant. This statement reports that the states having the transboundary water courses shall possess sovereign right to use their water and power resources in accordance with its policy in the area of protection and development of the environment and shall bear responsibility for ensuring the fact that their activities would not cause damage to the environment of other countries. Therewith the Heads of the states agreed that the improving of the use of the Syr Darya River water and power resources will require implementation of a package of measures for ensuring the water transit to the lower reaches of the River and to the Aral Sea.

The acts and statements concerning the Syr Darya River adopted at the level of Governments of the Central Asian states are briefly outlined below.

On April 5, 1996 in Tashkent the agreement was reached between the Governments of the Republic of Kazakhstan, the Kyrgyz Republic and the Republic of Uzbekistan on the use of fuel, power and water resources, and on construction and operation of the gas pipelines of the Central Asia region. The Parties entrusted the respective Ministries and Departments to elaborate the program of cooperation in the area of fuel and power complexes of the Central Asian states considering the mutual deliveries of electric power, gas, coal and oil products in coordination with the most effective use of the hydropower resources of the Syr Darya Basin for the irrigation needs.

On March 17, 1998 in Tashkent the Governments of the Republic of Kazakhstan, the Kyrgyz Republic and the Republic of Uzbekistan concluded new Agreement on the use of water and power resources of the Syr Darya Basin. In an effort to ensure the coordinated operation modes of the hydropower facilities and reservoirs of the Naryn – Syr Darya Cascade (the set of long-period storage reservoirs and seasonal-storage reservoirs in the Syr Darya Basin) and to supply the water for irrigation needs, the Parties considered it necessary to coordinate every year and take decisions as to the water releases, generation and transmission of electric power as well as compensation for losses of the electric power resources on the equivalent basis. In addition, the electric power generated by the Naryn – Syr Darya HPPs' Cascade and associated with the regime of the water releases during the growing season and the over-year regulation of the river flow to the Toktogul reservoir in excess of the needs of the Kyrgyz Republic is transferred to the Republic of Kazakhstan and to the Republic of Uzbekistan in equal shares. The compensation for this power is made by deliveries to the Kyrgyz Republic of the power resources (coal, gas, fuel oil and electric power) in the equivalent volume, and also by supply of other products (works, services) or in money terms upon coordination for creating the required annual and multiyear water storages in the reservoirs for the irrigation needs.

The operation modes of reservoirs, volumes of the power transfer, deliveries of the energy resources are approved by annual intergovernmental agreements based upon decisions made by representatives of the water management and fuel-and-power organizations headed by Deputy Prime Ministers of the participating states.

On July 20 – 25, 1998 in the Kyrgyz Republic at the Issyk Kul Lake the international seminar was held for the leaders of Ministries of Agriculture and Water Management, Power and Nature Protection Departments of the Central Asian states on the problems of rational use of the water and power resources of the region. The Seminar's participants have approved the Plan of Actions for implementing the Agreement on the Use of the Water and Power Resources of the Syr Darya River (Bishkek City, March 17, 1998).

In parallel with the intergovernmental agreements there are about 15 departmental documents concerning principally the mutual deliveries of the energy resources and the water releases from reservoirs. In a number of cases these documents are inconsistent with the legislative acts of the Republic of Kazakhstan on the water relations, power energy and entrepreneurship.

Summarizing the review and analysis as to the Syr Darya River problem the following should be noted.

1. The Agreements between the Governments of the Republic of Kazakhstan, the Kyrgyz Republic and the Republic of Uzbekistan of April 5, 1996 (Tashkent City) on the use of the fuel-and-power and water resources, construction and operation of the gas pipelines of the Central Asian region and of May 17, 1998 (Bishkek City) on the use of the water

and power resources of the Syr Darya Basin are aimed at the regulating of the issues on the electric power generation, power resources delivery and on compensations for them. Although in the Agreements it is stated about necessity of accounting the irrigation needs and the Aral Sea problems, these tasks are not still being decided.

The one-sided approach laid in these Agreements is inconsistent with: the Agreement on the joint actions for solving the problems of the Aral Sea and the Aral Sea Region, ecological sanitation and ensuring the social and economic development of the Aral Sea Region (Kzyl-Orda Town, March 26, 1993)); the Convention approved by the Heads of the Central Asian states and by the Government of the Russian Federation on solving the problems of the Aral Sea, Aral Sea Region and the Aral Sea Basin considering the social and economic development of the region (Nukus Town, January 11, 1994); the Declaration of the Central Asian states and international agencies on the problems of sustainable development of the Aral Sea Basin (Nukus Town, September 20, 1995); the Statement of the Heads of the Republic of Kazakhstan, the Kyrgyz Republic and the Republic of Uzbekistan on the use of the water and power resources (Bishkek City, May 6, 1006); the Almaty Declaration (February 28, 1997) and the Ashgabat Declaration (April 9, 1999) signed by the Heads of the Central Asian states.

2. Certain inconsistencies between the aforementioned interstate and intergovernmental documents are associated with the fact that in the interstate acts concerning the Aral Sea and its Basin signed by the Heads of the Central Asian states the issues of the hydropower systems and irrigation facilities in the Syr Darya Basin and of development of the hydropower in the Kyrgyz Republic were not considered in the context of overcoming the Aral Sea crisis.
3. The contradictions pointed above represent the unsatisfactory state of the legal base as a whole that regulates the joint use and conservation of the Central Asia water resources as well as the lack of coordination in the actions of the interstate bodies: the Interstate Council of the Republic of Kazakhstan, the Kyrgyz Republic and the Republic of Uzbekistan and the International Fund for the Aral Sea.
4. The Intergovernmental Agreements on the use of the water and power resources of the Syr Darya Basin are of the operative character and have the limited role. Their implementation will be obviously entailed by the disputes particularly on the part of annual intergovernmental agreements on the operation modes of the reservoirs, volumes of the electric power transfer and the energy resources deliveries.

1.3 Proposals on Improving the Legal Regulation of the Issues Concerning the Use and Conservation of the Water Resources of the Syr Darya River

The challenges of the use and conservation of the water resources of the Syr Darya River should be considered as a part of the complex problem of the Aral Sea crisis.

The conclusion of international agreements by the Aral Sea and its Basin is complicated in consequence of certain contradictions between the Central Asian states. Such clash of interests has arisen as the result of the policy of the Soviet Union which proceeded from the All-Union interests, and often the USSR took measures with the detriment to the economy and the environment of separate Union Republics, and these contradictions are strengthened by aggravation of the Aral Sea crisis.

In 1960-1980 on the territory of the Kyrgyz SSR there were constructed the Toktogul, Kurpsai, Tashkumyr, Shamaldy-Saisk and Uch-Kurgan hydropower systems and the Andizhan, Papan, Kerkidon, Kasansai. Kirov and Orto-Tokoi reservoirs. The aggregate water volume of the mentioned power and irrigation systems amount to 22.9 cubic kilometers but only 7% of the accumulated water are consumed now by the Kyrgyz Republic.

The Kyrgyz Republic incurred great losses because of the flooding by the irrigation facilities of 47 thous. ha of the lands including 16 thous. ha of the irrigated lands. The liabilities to the Kirgiz SSR specified by the interrepublican agreement with the Uzbek SSR were not fulfilled in regard to construction of the Andizhan hydroworks, of the Left-bank Kampyr-Ravat Channel and the Sokh reservoir with the result that over 25 thous. ha of the lands in the Osh Oblast remained without sufficient water supply. As a consequence of frequent non-fulfillment by other countries of the undertaken obligations on the use of the water and power resources, a critical situation occurs in the operation mode of the Toktogul hydrosystem that is forced to operate in the winter power regime due to short delivery of the solid fuel. Therewith there take place the overflowing of the reservoirs located downstream, the lands, populated localities and agricultural lands are flooded in the Republic of Uzbekistan, Republic of Tajikistan and the Republic of Kazakhstan.

The Soviet Union's authority bodies allocated financial resources for maintenance, repair and operation of the inter-republican hydrotechnical and irrigation facilities in the Kirgiz SSR. Now the Kyrgyz Republic faced the need to proceed from their own capabilities.

The Uzbekistan has acquired the greatest benefits. This Republic increased production of agricultural products by several times due to the irrigation developing. If in 1960 only the picking (purchase) of the raw cotton amounted to 2,949 thous. tons so will in 1987 it increased up to 4,858 thous. tons. Now in the Republic of Uzbekistan there is formed the average annual Syr Darya River flow in the volume of 4.1 cu. kilometers of water per year (11% of the total flow), and there are consumed 19.7 cu. kilometers of water (53%).

Kazakhstan had the greatest lands available in the Syr Darya Basin suitable for irrigation (9.8 mln. ha of 13.4 mln. ha), and there were 570 thous. ha of the irrigated lands (total by the region – 2,650 thous. ha). But the situation had changed radically for the worst which brought to the losses not only in irrigation but also in the fact that the area of the delta of the Syr Darya River has reduced, the Aral Sea has been practically lost for the Republic, and there occurred very complicated economic, medical-and-sanitary and ecological problems which caused the declaring of many administrative areas to be the zones of ecological disaster. Therewith it should be noted that the water incoming along the Syr Darya River is considerably polluted, and it may be used only under conditions of its purification from the harmful substances.

When viewing the developing situation from the standpoint of a pragmatist, it may be concluded that, at first, the situation hasn't principally changed since the Soviet period: the water resources of the Syr Darya River are used according to the former scheme as a consequence of which the state of the Aral Sea is continuing to become worse, and, secondly, in the radical measures on reorientation of the water policy in the Syr Darya Basin other Central Asian states are of little concern except the Republic of Kazakhstan. Conservation of the hydropower for the Kyrgyz Republic and the irrigation for the Republic of Uzbekistan is fairly more important than the expenditures for rehabilitation of the Aral Sea.

The Aral Sea crisis is focused precisely on the Kazakhstan's territory but this is, unfortunately, underestimated by the international organizations. The developed situation

requires from the part of the Republic of Kazakhstan to pursue more consistent protection of the region-wide and national interests.

It would be worthwhile to perform the following measures of the legal character.

1. First, it is required to develop and adopt the International Convention on Sustainable Development of the Aral Sea Basin.
2. With consideration for the future International Convention on Sustainable Development of the Aral Sea Basin, it is necessary to elaborate and adopt one more convention: the Convention on the Joint Use and Protection of the Transboundary Syr Darya River in the Central Asia.
3. Based upon these international treaties ratified by the legislative bodies of the Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Tajikistan and the Republic of Uzbekistan, it is required to prepare and confirm the water balance, the scheme of complex use and conservation of the water resources, and then the regional program on the use and conservation of the water resources of the Syr Darya River. It is advisable to formalize these documents at the level of intergovernmental international treaties.
4. Even in the process of preparing the intergovernmental treaties it is required to take actions on unification of the water laws of the Central Asian states. To do this requires to work out the model water code or analogous to it legislative act.
5. After adoption of the water codes or analogous acts by the legislative authorities of the Central Asian states, there will arise the issue concerning reformation of the interstate management system in the area of the use and conservation of the water resources and of drawing up the renewed normative base at the level of the subordinate acts.

CHAPTER 2. ECONOMIC ASPECTS OF THE INTERSTATE RELATIONS ON THE JOINT USE OF THE WATER RESOURCES

2.1. Analysis of Economic Efficiency of the Interstate and Intergovernmental Treaties on the Issues of the Use and Conservation of the Water Resources of the Syr Darya River from the RK Position

The USSR dissolution and the subsequent severe economic depression embracing new independent states of the Central Asia gave rise to a complex of grave problems, among them those related to the water resources.

The building up conflict potential has been caused by the attempt of the water sharing starting from the interests of separate countries of the Syr Darya Basin which by its essence means the separation of the single water system that couldn't function under the local territorial regime. This aggravated the water and ecological problems being already in existence in the region such as the Aral Sea challenge, accumulation of solid and liquid waste the volume of which only in Kyrgyzstan exceeds 550 mln. cu. m as well as the consequences of constructing large reservoirs in the mountain part of the region.

Only during the period from 1995 to 1998 between the states of the Central Asia there were concluded 23 bilateral treaties, agreements and protocols, and among them 15 documents on the water and power resources of the Naryn-Syr Darya HPPs' Cascade. This is conditioned by the degree of the problems' complexity arising while solving the core problem concerning the use of the water resources of the Syr Darya water system, and, firstly, by the conflicting requirements of the electric power and irrigation to the river flow regime.

In the Aral Sea Basin the Republic of Kazakhstan possesses the territory with the area of 34.3 mln. ha and the population size of 2.6 mln. people comprising two administrative oblasts: the South Kazakhstan Oblast and Kzyl-Orda Oblast.

This region ratio in the national gross production amounts to about 15%, and it has the agriculture and raw materials tendency in development oriented for servicing the former All-Union economic complex. Nevertheless there is located a number of large enterprises of the Republic representing about 60% of the aggregate industrial production in the area of machine building and metal working, non-ferrous metallurgy, petrochemical industry, the light and food processing industries, wood-pulp and paper, and pharmaceutical industries. To get out of the developed critical economic and water-and-ecological situation, it is targeted to reconstruct the economic structure in favor of developing the water non-consumptive branches of industry and establishing the science-intensive productions.

The share of the agroindustrial sector of economy makes up to about 40% in the aggregate social product. In agriculture the leading role belongs to the plant growing where prevails production of cotton, rice and fodder for the cattle rearing. From consideration of specific natural conditions, the stock raising is primarily oriented at the local consumption of meat and milk products and at the karakul breeding.

In the context of insufficiency of the water resources, it is assumed to perform the quantitative development in the agroindustrial complex of the region at the expense of enhancing the efficiency of production capacities (without expansion of the irrigated areas).

Along with it, the agroindustrial complex of Kazakhstan in the Aral Sea Basin consuming 93-95% of all used water resources of the region is that sector of economy the state and needs of which specify the water policy and tendency in the water system development.

As for Kyrgyzstan being a part of the former Union, it was considered as the consumer of fuel power resources of the adjacent regions, and construction of hydraulic power facilities on the Naryn River was developing as an economic source of maneuverable capacities for the electric power pool of the Central Asia and the South Kazakhstan with the priority regime of the irrigation operation of the Toktogul reservoir. This situation, normal under conditions of the USSR existence, in the present day realities of the states' sovereignty has gravely aggravated the problem of its own electric power survival and it faced to Kyrgyzstan the task of searching new alternative sources of energy and of enhancing the efficiency of the existing ones.

After dissolution of the Soviet Union Kyrgyzstan was forced to purchase at the prices close to the world ones the missing organic fuel to make up for the undergenerated electric power at the Lower Naryn HPPs' Cascade during the autumn-winter period.

Meanwhile, in the context of intensive economic activities, the water of the Syr Darya River is not useful for the drinking and fishery purposes, and at irrigating there is required almost general prophylaxis against salinization of the soil. Thus, the water flowing from Uzbekistan has the salinity of 1.1 – 1.2 g/l, by its chemical composition: having more than 40 ingredients the water meets the standards only by 50% of the indicators, and at the water reuse for irrigation it requires to be diluted many times.

Reasoning from the aforesaid, the goal of the water policy and strategy of the Republic of Kazakhstan is development of the system with sustainable use of the water and land resources of the Aral Sea Basin tended for maintaining the quantity and quality of these resources at the optimum level.

However the proposed by some Party solutions on the focal issues are not always acceptable for the other Parties, therewith it should be noted that the mechanism for implementing the taken decisions is not yet developed on account of a number reasons as follows:

- The signed agreements and treaties were executed in isolation from the existing international legal rules and in the absence of any legal base that imparted them the character of the single economic deal;
- The most part of the agreements signed at the intergovernmental level (and not ratified by the Parliaments of these countries) by the leaders of the Departments not authorized to solve the issues of the interstate relations caused their extremely low economic efficiency;
- Various approaches to the issues of use of the Syr Darya River water resources based upon only national interests and the quest for solving a certain problem to the detriment of other countries enhancing the vulnerability of each of the Central Asian state makes it impossible to implement the projects economically feasible only for one of the countries;
- The inadequacy of the economic reforms complicates execution of separate Provisions, Protocols and Agreements as a whole.

The analysis of the course of implementing the Interstate Agreement *On the Use of the Water and Power Resources of the Syr Darya Basin* indicates that the Articles 2 and 4 are being executed as follows:

According to Article 2, in the efforts to ensure the coordinated operation modes of the hydraulic and power facilities and reservoirs of the Naryn-Syr Darya Cascade and to supply water for the irrigation needs, the Parties consider it necessary to coordinate the matters every year and to take decisions concerning the water releases, generation and transfer of the electric power and compensations for the energy resources losses on the equivalent basis.

Article 4 stipulates the provision for operation of the Toktogul reservoir in the irrigation regime, and it includes the liabilities of Kazakhstan and Uzbekistan to participate equally in purchasing the electric power during the summer season generated in parallel with the released water from the Toktogul long-period storage reservoir. The electric power in summer should be paid either by deliveries of coal and natural gas or in the money equivalent for satisfying the demands of Kyrgyzstan in fuel in winter.

Realizability of these Articles made it possible, on the basis of this Agreement, for the participating states to sign, for the first time, the multilateral Agreement on the Joint and Multipurpose Use of the Water and Power Resources of the Naryn-Syr Darya Reservoirs Cascade in 1998 incorporating concrete information about the volumes of the water releases and electric power from the Toktogul hydraulic system in return for gas, coal, fuel oil and electric energy. There was prepared for its signing the interstate Agreement on the Use of Water and Power Resources of the Naryn-Syr Darya Reservoirs Cascade in 1999.

In Article 3 the Parties commit not to take actions violating the agreed regime of the water use and power resources delivery or infringing the rights of other Parties to get the mutually agreed volumes of water, power resources deliveries and their transit through their territories. One of the conditions for implementing this Article of the Agreement is the ensuring of the parallel operation of the power grids of the Central Asia.

The Kyrgyz Republic and the Republic of Uzbekistan fulfil the provisions of this Article. In the Republic of Kazakhstan due to restructuring and privatization of the branches of the fuel and power complex there took place the forming of the electric power market therewith the dominating form of property became the private property which because of imperfection of the legislation doesn't bear any responsibility for executing the interstate agreements.

Thus, during the growing season of 1998 the main provision was not fulfilled: the ensuring of the parallel operation of the power systems in the electric power pool of the Central Asia (EPP CA).

The Agreement incorporates also the provisions assuring delivery of the water and power resources through the credit lines and other financial instruments (Article 5). In Article 9 of the Agreement there is stipulated the procedure for settling the conflicts through the arbitration courts by the initiative of the participating states.

In Article 10 it is stipulated that in the efforts of further enhancement in the water and power resources regulation and use, the improvement of economic interrelations tended at ensuring the guaranteed water supply in the Syr Darya Basin, the Parties agreed to consider jointly the following issues:

- Construction of new hydraulic power facilities and reservoirs or search for alternative energy sources in the region;

- Transfer from the existing at present barter settlements to the financial relations;
- Development of the pricing mechanisms based upon the uniform tariff policy;
- Provision for safety operation of the hydrotechnical structures located in the Syr Darya Basin;
- Economical and rational use of the water resources with application of the water-saving technologies and technical means for irrigation;
- Decrease and cessation of discharging the polluted waters into the water sources of the Syr Darya Basin.

The first step on the path of implementing this Article was the Decision *On the Establishing of the International Water and Energy Consortium* taken by the Heads of the Participating States of March 26, 1998.

The Council of Prime Ministers of the Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Tajikistan and the Republic of Uzbekistan confirmed the Provisions of the International Water and Energy Consortium (IWEC) in which there were specified the goals, objectives, structure, functions and liabilities of the Consortium, and the decision was taken on the drawing up of the Draft Treaty and of the foundation documents.

The establishment of the International Water and Energy Consortium will make it possible to ensure the coordinated irrigation regime and rational sharing of the water and power resources in the region.

Before the IWEC setting up, the BWO *Syr Darya* and UDC *Energia* will remain to be the executive bodies ensuring the regime of the water releases from the reservoirs and the transfers of the electric power (Article 8).

This Agreement is a framework one, and it is intended for the period up to 5 years and it will be automatically prolonged for the next five-year periods; some other states may accede to the Agreement (Articles 12, 13).

At present the Republic of Tajikistan is in process of procedure for acceding to this Agreement.

As a whole, the successive realization of the Agreement by the Central Asian states will facilitate in stabilizing the water management situation as well as the power and fuel supply of the Central Asian states.

To implement the adopted Agreements, the Central Asian states should make efforts for realizing the Plan of Actions which stipulates the following measures:

- To develop the program for modeling the operation modes optimization of the Naryn-Syr Darya Reservoirs Cascade;
- To draw up and submit proposals on ensuring the uniform tariff policy for all types of the power resources delivered each other in the framework of this Agreement;

- To develop the common procedure on the complex regulation of the transboundary rivers flows considering the balanced interests of the Basin's states and to determine the volumes of compensations.

The challenging and urgent matter is the provision for the financial mechanism and coordination of the power requirements in the water consumption by the community and economy with the schedules of the reservoirs drawdown by optimizing the use of the water and power resources, arranging the respective fuel-electric power transfers and establishing the insurance cash fund by the setting up of the water and power consortiums of five states of the region.

Acknowledging these key provisions, the states of the region have not yet worked out the single mechanism of implementing the specified principles. There are various approaches, and all of them should be analyzed from the point of view:

- The unity of the economic mechanism with the right to use water and of the legal documents;
- Completeness of conformity with the aforesaid objectives;
- Feasibility of implementation.

The economic factors retarding fulfillment of the Agreements are as follows:

1. Lack of coordination in the tariff policy while performing mutual settlements by all types of the power resources and their transportation (Article 4). Including:
 - 1.1 By the interstate transfer of the electric power including its transit and the frequency control.
 - 1.2 By compensation of the costs on the maintenance and operation of the Toktogul reservoir and on the services in the water supply.
 - 1.3 By the prices for delivery of the natural gas from Uzbekistan and coal from Kazakhstan.
2. Lack in the Agreement of the mechanism for compensating by the Parties the damages as a result of the failure to meet commitments of the Agreement by reasons of the water situation change. (In order to prevent adverse consequences of 1988 when due to high water level and water availability the water consumption from the Toktogul reservoir by Uzbekistan and Kazakhstan was reduced in the consequence of which Kyrgyzstan will not receive the required volume of gas (100 mln. cu. m) at the TPP in Bishkek in 1999).
3. Different rates of restructuring and privatization of the branches of the fuel-and-power complex and of the water economy.
4. Lack of coordination in the rational strategy on the water use in the Naryn – Syr Darya Rivers basin and the economic strategy of the states.

On the basis of the coordinated water and power strategy, it is required to develop for the prospects and to adopt the Program on Cooperation of the Central Asian States in the Area of Rational Use of the Water and Power Resources in the Central Asian Region.

Therewith it is necessary to develop the Program on Cooperation of the Central Asian States in the Area of Rational Use of the Water and Power Resources of the Region starting from the demand forecast on the water and energy resources reasoning from several scenarios on the economic strategy of the Central Asian states for the prospects considering the provision for the sanitary water releases to the Aral Sea Basin.

Proceeding from the outcomes gained and their joint analysis, the Central Asian states should come to the sound strategy in the water use and adjust the structural policy of developing the branches of economy, especially of agriculture and power industry, and adopt the Concept on Economic Integration of the Central Asian Power Grid for the prospects.

The experience of the low-water year 1997 and high-water year 1998 depicted that imperfection of many issues in the Agreement may bring about to the short deliveries of water in the first case and electric power in the second case.

During the period of February 10-11 of the current year in Tashkent the expert groups of three Republics drew up and coordinated the Draft Intergovernmental Agreement on the Joint and Multipurpose Use of the Water and Power Resources of the Naryn-Syr Darya Reservoirs Cascade in 1999.

In conformity with the agreements approved, it is planned to ensure the electric power transfers in the volume of 2.2 billion kWh during the growing season combined with the additional water releases in equal volumes by 1.1 billion kWh to the Republic of Uzbekistan and the Republic of Kazakhstan. The provision is made for delivery from the neighboring Republics in the form of mutual settlements of the following: from the Republic of Uzbekistan – 500 mln. cu. m of natural gas; from the Republic of Kazakhstan – 566.7 thous. tons of coal from the Karaganda coal basin and 250 mln. kWh of electric power.

During the past period of 1999 the TPPs in Bishkek and Osh have received 113.3 mln. cu. m of natural gas from the Republic of Uzbekistan in account of the coming electric power transfers during the growing season while from the Republic of Kazakhstan no coal deliveries were made during the same period whereas the anticipated coal deliveries should be made.

Thus the forecast of the high-water year of 1999 may cause the failure to fulfil the Draft Agreement provisions and, as a consequence, the aggravation of the situation as to the fuel delivery to the TPPs in Bishkek and Osh whereas these TPPs compensate to the consumers of the Kyrgyz Republic for the electric power short-delivered by the Toktogul HPPs Cascade because of the water accumulation during winter period for the irrigation needs of Uzbekistan and Kazakhstan.

Reasoning from the aforesaid, it should be stated that from 1994 to 1999 the process picked up speed in drawing the Central Asian states closer while solving the problems on the joint use of the water and power resources of the Syr Darya Basin. Unfortunately, this process proceeds very slowly, and it is characterized by low economic efficiency of the taken decisions inasmuch as the most part of the concluded treaties and agreements have the framework and principal character, and the agreements concluded on concrete water objects, for a number of reasons, are being executed only partially by each of the Parties. Nevertheless, it may be noted that the awareness of the significance of the problem and cooperation at its solving is already available at all management levels. It is obvious that there is required the common interstate concept on the joint use of the water and power resources supported by the mechanism for economic regulating and stimulating the rational water use.

2.2 Development of Proposals on Forming the State Economic Relations Mechanism on the Joint Use and Conservation of the Syr Darya River Water Resources in the Context of the RK Position

When developing the respective principles on the joint use and conservation of the Syr Darya River water resources, in our view, the starting position in the context of diversity of the situation versions is the detecting of the points of contact, and this is possible in the case when the economic priorities of an individual country will coincide with the problems common for the Central Asian countries. To achieve this, it is required to have the fair assessment of the factors which will enforce to make the choice on the joint use of the water resources of the region and prerequisites on the base of which the states may come to the principled agreements. In the opinion of the most part of specialists from the Central Asian states, the leading factors will be as follows: the electric power sector, agriculture, industry and the Aral Sea problem.

The combining of the interests of the Syr Darya Basin states specifies these principles that will provide the basis for the economic model on the joint use and conservation of the water resources. Along with it, there is the opinion that when developing the proposals on the forming of the interstate mechanism it would be advisable to use as the basis the principles applied in the former Soviet Union when the policy-making authorities set the regional restrictions. It is self-evident that after dissolution of the USSR this principle is unacceptable but its separate elements may take place in the interstate economic relations mechanism (IERM) in case of extreme situation jeopardizing the economic or some other security of one country by another country. True, this principle in the former USSR has become one of the reasons for emergence of the Aral Sea problem to the detriment of the Kazakhstan's economy, and it couldn't take advantages involved in the common approach to the whole river system of the Syr Darya Basin.

At the same time, the administrative approaches shouldn't be ignored if their goals, objectives and tendencies meet the respective requirements of the CAR states. However, in the foundation of the interstate mechanism there should be the market relations which level of development in the CAR countries is not yet high, and up to a certain time the administrative methods of the interstate mechanism would be forced to be applied as supplementary elements the functions of which at developing the market relations will transform towards their gradual withering away.

Reasoning from this, one of the core objectives in the IERM establishment is the discovery of the acceptable at present optimum relationship between the administrative and market methods of management and regulation in the area of the joint use and conservation of the water resources. These methods should be based on the understanding that the Syr Darya River water resources represent a complex of complicated hydropower and hydrotechnical systems and water projects requiring special structures for providing their joint functioning at their close interrelation with all branches of the economy on the territories of Kyrgyzstan, Uzbekistan, Tajikistan and Kazakhstan.

The major administrative levers: the rationing of the fresh water diversion, the restricting of the consumptive water use and of the pollutants discharge by the economic entities of every organizational and legal forms - should be common for all CAR countries.

The limits and charges for the water resources should become the components fundamentally associated with the economic relations mechanism on the joint use and conservation of the Syr Darya River water resources. Therewith, the mechanism of payments for the water resources, without reference to the CAR countries, should be fixed based on the

following principles: the one should pay who causes the damage to the water objects using them for the water diversion for the domestic, drinking, industrial, transport, electric power or another needs and for the minerals mining, the charges for the water use should be transferred to the budget (or to the Water Bank which could be founded within the limits of the country, river basin or Oblast according to the scheme proposed by experts from Uzbekistan), and these financial funds should be spent strictly for rehabilitation and defense of the water reservoirs and their protection against adverse impacts; equal economic responsibility of the entities on the territory on the CAR countries located within the limits of the Syr Darya Basin for failure to meet the agreed rates, rules, norms regulating the regional water relations, the joint financing of the common basin's works in rehabilitation and protection of the water objects; economic cooperation of the CAR countries under extraordinary situations and for preventing the loss in case of the transboundary damage to the environment.

It should be noted that at the present-day system of the water use the RK suffers enormous economic and ecological damage amounting to over \$43 mln. annually. The situation has developed that the mutual interests are considered not adequately. The principles and mechanisms of the economic regulation and stimulating the rational use of the Syr Darya River water resources as well as compensating for the damages caused by violation of the legislation of the RK should be based upon the interstate treaties and agreements relying on the firm water releases to the Small Aral Sea, and this shouldn't be complicated by mutual settlements; on the one hand, the equivalent costs of the RK on the territory of Kyrgyzstan and Uzbekistan for enhancing the water quality should be compensated by the water supply from these states, and on the other hand, delivery of low-quality water to the RK should be compensated by Kyrgyzstan and Uzbekistan. At the same time Kazakhstan should make the commitment to deliver to the Small Aral Sea all firm releases of the water coming with the Syr Darya River from Uzbekistan and Kyrgyzstan.

Certainly, a part of these functions should become the prerogative of separate states, and the other part should be the function of the Interstate Council. The Interstate Council engaged in developing various agreements, treaties, resolutions, etc. when

tackling the problems gives special emphasis on the political methods. However, even at this stage it's necessary to support the political decisions by concrete economic actions on the basis of the purpose-oriented financing. In our opinion, it is required to set up the Interstate Bank for Solving the Problems on the Joint Use of the Transboundary Rivers (IBTR) of the Central Asian Region.

The aforementioned economic principles may be realized only in case when the entities using the water meet the rates and rules set by the International Water and Energy Consortium which is bound to exercise monitoring, regulation and control over the rational water use. In this case all financial transactions should be made through the IBTR.

Presumably the Bank will be founded on the base of the share participation of the CAR countries, the financial funds contributed by the legal entities and physical persons of the CAR states and the assistance of international agencies, and the Bank will function in cooperation with the International Water and Energy Consortium. The activity of the Bank will involve the financing of the projects on complex reconstruction of hydrotechnical facilities on the territory of the countries in the Central Asian Region, the crediting of the agroindustrial complex and projects oriented to the enhancing of efficiency in the water resources use.

The synthetic indicator of the functioning effectiveness of the Interstate Council and its structures including the Interstate Bank on the Joint Use of the Water Resources and the International Water and Energy Consortium should be the positive changes in the situation in the

Aral Sea Region and in the Syr Darya River Basin as a whole, and in this case the qualitative and quantitative parameters of the water flowing into the boundaries of the Republic of Kazakhstan should be the concrete reflection of their activities.

The economic aspects of the interstate relations on the joint use of the transboundary rivers' water resources reflect the level of formation and development of such relations, and they are the integral part of the economic interrelation between Kazakhstan, Uzbekistan and Kyrgyzstan. The analysis of the economic efficiency of the interstate and intergovernmental treaties and agreements on the matters of the use and conservation of the water resources demonstrates that the process of transition from standing in opposition each other to the constructivism, i.e. to cooperation, takes place under extremely complicated conditions.

When developing the principles of the compensatory costs there shouldn't be mixed the interstate and inter-economic entity relations. In the first case it is kept in mind to conclude the interstate and intergovernmental agreements, treaties and other documents regulating provisions of the inter-economic entities relations. In the second case it is meant to apply the compensatory costs by the economic entities of one state to the economic entities of the other state in conformity with the inter-economic entities agreements and treaties. Repayment of the debts of the economic entities is not the function of the state, and therefore it cannot be included into the expense item of the national budget.

Hence it follows that the principles of the economic relations mechanism should rely upon the precise and coordinated legal base consistent with the internal legislation of the state and on the mutual economically advantageous cooperation of the economic entities of various countries.

In the Republic of Kazakhstan, as a consequence of the developed market relations, implemented reforms and privatization, the state ownership is practically unavailable in the sphere of the mining industry and the fuel-and-power complex. Herefrom follows the fact that the Government of the Republic of Kazakhstan is incapable to carry out the requirements of the Kyrgyz Republic on the electric power purchasing with the settlement through the coal delivery. Therewith it should be remembered that in the Republic of Kazakhstan the levers and methods of the state management are not practically formed concerning the interindustry redistribution of the resources, particularly redistribution of the products and services. As a consequence of it, the old mechanism of the interindustry redistribution of the resources and products has already been collapsed, and the new market mechanism has not been yet formed.

Let's consider the scheme of the resources redistribution existing in the former USSR. The both Republics were under the command of the Central Authority Bodies (the Center). The flows of commodities and services were specified by the norms set by the Center. In the similar ways there were determined the flows of money earmarked for the Kirgiz SSR for development and operation of the hydrotechnical facilities. The financial resources of the water users were accumulated at the Central Bank, and these funds were managed by the Center as well. The great advantage of such system was the fact that the interrepublican relations were never aggravated inasmuch as it was the Center who was accountable for the volume and time of the aforesaid flows. At the same time the administrative management methods demonstrated the full-scale collapse and incapability to manage the complicated and, especially, sophisticated systems. As the most dramatic example of it there may serve the Aral Sea catastrophe.

Let's consider the components that remained after the USSR dissolution. These components are the states and the flows of commodities and services they need. But therewith it is required to consider that the level of the Republics' development is different, and moreover,

the ways of the countries' development, the reforms and methods of their implementation differ as well. In the Kyrgyz Republic the main consumers and suppliers of goods and services conserved the old type of the ownership – the state one. In Kazakhstan the situation is exactly the opposite one: the main type of the ownership is the private one or private ownership with a minor share of the state-owned property. In the context of it, the state has no capability to carry out the undertaken commitments on the coal delivery in return for the water releases for the irrigation needs or for the electric power; besides, in view of the lack of the financial funds in the budget, the state is unable to make provision for the normal operation of the state-owned mines. As to the electric power, in Kazakhstan there has been already formed the electric power market with the single power supplier and a number of insolvent consumers, and the access vent to this market is closed for the Kyrgyz electric power suppliers.

The main functions facing the new scheme of the resources redistribution may be formulated as follows:

1. Capability to implement the interstate agreements without directive intervention of the Government;
2. Promptitude in executing the orders and their tendency in conformity with the IWEC strategy;
3. Creation of additional source of financing the large-scale projects oriented to improving the situation in the Syr Darya Basin;
4. Accumulation of the funds incoming from the water users of the Syr Darya Basin and their earmarked allocation;
5. Simplicity of the interstate settlements;
6. Possibility to express promptly the various deliveries of goods and services in the money terms;
7. Minimization of the interstate money flows;
8. Optimization in selecting and distributing the resources on the domestic market of the RK.

The main organizational structure responsible for the interstate interaction is already being established: this is the IWEC. Respectively, it is entrusted with the execution of the two first functions. We proposed the IBTR to be the executor of the technical function on managing the funds within the framework of the IWEC, and its function was indicated above. Thus there remain four last functions unprovided with the respective organizational structures. All these functions may be solved in the framework of simple interstate clearing. By the definition the clearing is the ensuring of the equality of the goods deliveries and payments between two countries and their annual balancing. It's necessary to note that the clearing balance reveals the imbalance in the good turnover and should be covered by the country-debtor in the way and time stipulated by the respective interstate agreement.

In our view, the founding of the Clearing Center of the RK on redistributing the resources of the Syr Darya Basin which will undertake these last functions would be the best solution of the problem in hand.

As indicated by the scheme (See Chart 1) the Clearing Center manages the funds flow on the clearing account of the RK in the IBTR in accordance with the requests from the IWEC and from the branches of the RK industry. All flows of goods, services and financial funds within the IWEC framework and in conformity with the interstate agreements and treaties are counted up by the Clearing Center in the value terms, and the balance of the clearing account of the RK in the IBTR is being determined. The funds incoming from the water users of the Kazakhstan's part of the Syr Darya Basin shall enter the national budget of the Republic. A certain part of these funds received as payment for the water delivery along the territory of Kazakhstan shall remain at the disposal of the state. From the remained amount Kazakhstan paid in favor of Kyrgyzstan the compensatory costs for maintaining the hydrotechnical facilities. We propose to accumulate these financial resources also on the clearing account in the IBTR. Then all the funds accumulated on the clearing account are allotted, depending upon the requests of the IWEC, for purchasing coal, payment of the compensatory costs on the maintaining the hydrotechnical structures of the Naryn-Syr Darya complex, financing the purchases of the electric power on the returnable basis from the Kyrgyz Party. Therewith the economic entities of other Republics work only with the IWEC and IBTR. In this case the proposed scheme is the universal one. As may be seen from the complete version of the scheme, the inclusion of supplementary components only added some complexity to its apprehension but didn't change the quantity of the interstate flows of the Republic of Kazakhstan.

Thus, for example, in conformity with the interstate agreements the Kyrgyz Republic delivers the releases of good-quality water along the Syr Darya River for irrigation needs of Kazakhstan in the volume $X \text{ km}^3$. The volume of this release is recorded at the Clearing Center. In its turn Kyrgyzstan requires to get Y tons of coal for the TPP operation during the winter period. The Clearing Center by using the funds being at its disposal on the clearing account shall buy the coal and transport it to the place of destination.

The proposed scheme should ensure the real balanced turnover of goods within the IWEC and finally relax the tense situation in the region.

CHAPTER 3. IMPROVEMENT OF THE REGIONAL SYSTEM FOR REGULATING AND DISTRIBUTING THE SYR DARYA RIVER FLOW

3.1 Water Management in the Syr Darya River Delta and Rehabilitation of the Small (Aral) Sea

The existing in the former Soviet Union system of regulating and distributing the Syr Darya flow pursued the goal of sustainable water supply to the farms and population of the region ensuring the indisputable execution of the state assignments, primarily, on the cotton and rice production at the minimum costs and observance of the specified restrictions (Table 1).

The water consumption by the “irrigated agriculture” branch has been set on the basis of optimizing the location of the irrigated areas in the Basin (by the minimum reduced costs criterion) and the rates of the specific water consumption for individual water management regions.

The hydropower as the industry – the water user was functioning under the forced conditions when the electric power was generated at the HPP by using only the irrigation and sanitary releases. Therewith the interests of the natural economic complex of the Delta and the Sea were not practically considered in the water balance of the Basin.

To accomplish the full and efficient use of the water resources, in the basin there was formed a complex system for regulating the river flow including a large number of the channel and off-channel reservoirs with the total active storage over 26 km³. Therewith the decision system management functions of regulating the river flow were performed by three hydraulic systems of the Naryn-Syr Darya Cascade: the Toktogul hydroscheme with the long-period storage reservoir, the Kairakkum and Chardara hydrosystems with the seasonal-storage reservoirs.

After independence the Central Asian states agreed to remain in force the established in the former USSR regulations for managing the Syr Darya water resources.

However the necessity to revise the existing system of regulating and distributing the Syr Darya flow is specified by the following prerequisites:

- Changes in the requirements of the independent states of the region concerning the water resources of the Syr Darya River in the context of their orientation to the national programs of development and transition to the market economy;
- Infringement of the centralized system of managing the river flow of the Syr Darya River in view of the fact that the main regulating hydrosystems are located on the territories of different states: the Toktogul hydrosystem – in Kyrgyzstan, the Kairakkum one – in Tajikistan and the Chardara – in Kazakhstan.

One of the feasible approaches for solving the problem of regulating and distributing the Syr Darya flow at the regional level shall be the adoption of the Convention on the International Water Resources on the basis of the fundamental principle of equal use of the common water resources by various countries and joint responsibility for their protection.

The basic changes in the regional system of regulating and distributing the Syr Darya flow should be associated with the transition from the single-purpose water management in the

interests of irrigation (in former USSR) to the multipurpose one: in the interests of irrigation, power sector and ecology (under the present-day geopolitical conditions).

Respectively, when solving the conflict situations in the water management being of the interstate nature, in view of the principle of the common efficiency of the national economy the principle of equitable compromise should become the key one.

The Syr Darya delta and the Small (Aral) Sea located at the epicenter of the ecological disaster zone should be considered as the priority water users of the Basin's integrated water system.

The wetlands of the Syr Darya delta are the basis of the sustainable existence of the aquatic and nearshore ecosystems of the Kazakhstan's Aral Sea Region, the base for fishery and fodder production, and the prerequisite for the vital activity of sixty thousands of the rural population of the Kazalinsk and Aralsk Rayons of the Kzyl-Orda Oblast. The principle issue when choosing the delta management scheme shall be the determining of the Syr Darya status in the system of the territory watering. As to this matter, two alternatives are possible: "the river – irrigator" and "the river – drain".

Respectively, at present two technical schemes of the delta watering are under discussion: the dam scheme and the diversion scheme.

The dam scheme provides for construction of two water-lifting hydraulic facilities at the Amanotkel and Aklak sections instead of two existing temporary structures.

The diversion scheme for the delta's territory watering provides the use of the existing Kazalinsk hydrosystem as the water intake.

As a consequence of the Aral Sea level drop, in 1987 its water area was divided by the natural sill (the bottom level is 39.0 m abs.) into two parts: the Big (Aral) Sea and Small (Aral) Sea being fed by the residual flows of the Amu Darya and Syr Darya Rivers respectively. In the Small Sea there was formed the positive water balance, and the excess flow was discharged through the canal at the natural sill to the Big Sea. By the early 1992 the level difference between the water areas exceeded 3 meters (the Small Sea – 40.3 m abs., the Big Sea – 37.1 m abs.). The water flow on the account of the levels difference has brought to the bottom scouring of the dividing the Sea sill, and its elevation decreased up to 38.0 m abs.

In 1992 in the Strait of Berg the construction of the dam was commenced to restore and stabilize the Small Sea level at the elevation of 42-43 m abs. With the storage volume 27-30 km³ and the square of the water area 3.3-3.6 thous. km². By the spring of 1999 the filling of the Sea reached the elevation level of 42.3 m abs. However the insufficient height of the dam and its unstable profile caused the dam's deterioration by the wave and wind setups. As a consequence of it, almost complete emptying of the Small Sea has occurred (Table 3).

Due to construction of the technically perfect Kokaral dam with the sluiceway structure in the northern part of the Aral Sea, the fresh water reservoir will be actually built – the lower step of the Naryn-Syr Darya Cascade. Stabilization of the sea shores with the forming of stable shallow waters favorable for development of the flora and fauna, and also the seawater desalting will make provision for enhancing the biological productivity of the sea.

In this connection, it is intended to displace gradually the acclimatized flatfish by the aboriginal species of fish (wild carp, bream, pike perch, etc.) and to raise the true sturgeons (acipenserids).

The revival of the fish industry will enhance the employment of the local population and the provision of the region with the fish products. The decrease of the area of the dried bottom of the sea and the salt and dust transfer abatement will improve the farming conditions and the habitat in the Kazakhstan's Aral Sea Region.

The water delivery to the Small Aral Sea and the Syr Darya delta will be effected due to the firm water releases by the reservoirs cascade in the volume of 3.0-3.2 km³/year and by the income of the unregulated flow with the volume of 2.0-2.5 km³/year. The established average annual inflow (about 5.5 km³/year) will ensure the delta watering (1.8 km³/year), the renewal of the water losses in the Small Aral Sea (3.0 km³/year) and desalting water discharge to the Big Aral Sea (0.7 km³/year).

3.2 Optimization of the Power and Irrigation Use of the Syr Darya River Flow

The most important level of managing the water resources of the Syr Darya Basin is the Toktogul integrated hydrosystem of the irrigation and power-generation purpose incorporating the long-period storage reservoir with the active storage of 14.5 km³ and the hydroelectric power plant (HPP) with the installed capacity of 1,2000 MW. In accordance with the design, the Toktogul hydroscheme operated basically in the irrigation regime when during the growing season the water delivery amounted to 75% of the yearly volume of the reservoirs drawdown. Such operation mode has rendered much assistance in development of irrigation in the Republics located downstream this hydrosystem where about 1.3 mln. ha of the lands were irrigated on account of the Toktogul reservoir. Therewith the electric power generated by the irrigation water releases in the amount of 2 TWh/year was exported to Uzbekistan and Kazakhstan. As a recompense for the undergenerated electric power at the HPP during the autumn-winter period, Kyrgyzstan received for compensation the power resources: gas from Uzbekistan, coal from Kazakhstan, and coal and oil products from Russia.

At present in view of the stoppage of the power resources compensatory deliveries from the former Union Republics, Kyrgyzstan is forced to purchase the required power resources abroad at the prices close to the world ones. However under conditions of the crisis state of the economy the alternative way for improving the power supply of the Republic became the switch of the Toktogul hydrosystem to the power mode of operation. Therewith Kyrgyzstan considered it powerful to draw down during the winter period the half of the useful yield of the Toktogul reservoir (Table 3). This enabled to increase the electric power generation by the cascade of the Lower-Naryn HPPs in average by more than 3 TWh/year, and became possible for Kyrgyzstan to reduce the annual purchasing of about 1 mln. of the fuel equivalent.

At the same time, the increase of the power releases from the Toktogul reservoir by 3 km³ aggravated the ecological and ice situation in the middle and lower courses of the river during the winter period, and the respective reduction in the in the growing season releases caused the water limitation in the irrigated farming and, as a consequence, the decline in the farm-production in Uzbekistan and Kazakhstan.

The fundamental means of coordinating the operation modes' contradictions of the power sector and irrigation shall be the reregulation of the power releases by the lower steps of the reservoirs cascade. However the active storage of the downstream located Kairakkum (2.5

km³) and Chardara (4.7 km³) reservoirs designed for regulating the lateral inflow is insufficient for executing the counter-regulation functions.

As practicable means of enhancing the degree of the river flow regulation in the lower reaches of the Syr Darya River by various organizations the following measures were considered:

- Increase of active storage of the Chardara reservoir by raising the design elevation up 3 m;
- Use of the Arnasai depression basin as the regulating reservoir;
- Construction of a new channel reservoir in the area of the Shoulder settlement.

However the practical implementation of the aforesaid proposals is rather controversial.

Thus, the settlement of the developed conflict situation is limited to the search of such compromise operation mode of the Toktogul reservoir (the growing season release in the range from 5.36 to 8.36 km³) when the relative damages of the power sector and irrigation would be equidimensional.

In Figure 1 and Table 4 there are indicated the results of optimizing the irrigation- and power-purpose use of the Toktogul hydrosystem by the criterion of equality of the relative damages of the conflicting parties. At the given initial characteristics of the damages, the “fair” compromise decision shall be reached at the value of the vegetation period release of 6.56 km³ and respectively of the autumn-winter release – 4.16 km³. In this case the relative losses of the power sector (\bar{O}_y) and irrigation (\bar{O}_e) are equidimensional. At increasing the growing season release in relation to the “fair” one, the irrigation component will compensate the losses of the power component in the amounts ensuring equalization of the relative losses. At the decreasing of the vegetation period release in relation to the “fair” one, the power sector will compensate the irrigation losses respectively.

In view of different specific weight of the irrigation and power components in the case under consideration “the optimum fair decision” is achieved at the irrigation regime of the releases from the Toktogul reservoir. In this instance, relative losses in irrigation and power are the minimum ones (0,125). Therewith Uzbekistan and Kazakhstan compensate to Kyrgyzstan for the power losses in the amount of \$96 mln. per year.

3.3 Improvement of Water Quality in the Lower Course of the Syr Darya River

The regional water supply system set up in the former Soviet Union made provision for the reuse of the return waters for irrigation during the low-water years. However beginning since 1960 the return waters, primarily collector and drainage water, were used not only during the low-water years but in the course of the average water years as well. The actual excess of the water diversions in relation to the available water resources of the Syr Darya River during some years amounted to 20 through 60 per cent.

At present on the territory of Uzbekistan within the limits of the Syr Darya Basin a great quantity of polluting substances enter the river channel with the collector and drainage waters from the irrigated fields and the discharge waters from industrial plants and public utilities (salinity of the river flow at the boundary with Kazakhstan is about 1.3 g/l). This situation is the

optimum one for the Republic since it is not required to take rather complicated and expensive measures on preventing the river flow pollution.

Under the developed situation Kazakhstan as the downstream water consumer is subject to considerable losses: economic, social and ecological in consequence of the inadequate quality of the incoming transboundary flow. It is obvious that the optimum situation for the Republic would be when the degree of pollution of the river water available would be at the level of the flow quality in the zone of its formation (salinity 0.2-0.3 g/l).

The compromise decision on the basis of the principle of evenness presumes the determination of such value of the river water salinity in the boundary section of the Syr Darya River M_k in the set range of mineralization ($M' = 0.25 \leq M_k \leq M'' = 1.25$) when the relative losses of Uzbekistan and Kazakhstan would be equidimensional.

The losses of the upstream water consumer (Uzbekistan), evidently, should include the costs for the actions on reducing the collector and drainage water and the waste water discharges into the river as well as for their purification.

The losses of the downstream water consumer (Kazakhstan) should be made up of the farm-products' losses on the irrigated lands when using the water with the raised salinity, the decrease in productivity of the natural complexes in the delta's areas and supplementary costs in the drinking water supply systems.

In Annex, Figure 2, the example is given illustrating the key scheme related to the search of the compromise decision for settlement of the conflict on the basis of the proposed methodical approach.

The reduction in salinity of the river water in reference to the "fair" value shall bind the downstream water consumer to compensate for the additional losses to the upstream water consumer. Respectively, the upstream water consumer shall compensate for the losses of the downstream water user in case of the salinity increase at the design section in reference to the "fair" one.

CHAPTER 4. WATER MANAGEMENT ACTIVITIES AND RATIONAL WATER USE

The main water resources of the Syr Darya River are made up by the Naryn and Karadarya Rivers in the upper reaches (up to 80% of the flow) and by inflows of the Chirchik, Kenes and Arys Rivers in the middle course. The Naryn, Karadarya and Chirchik Rivers have the ice and snow intake, and the Keles and Arys Rivers – the snow and rain one.

The chronological diagram of the annual Syr Darya River discharges' variations indicates the cyclicity of the low-water years and high-water years sequence. The low-flow periods occur over 3-4 years and last 5-6 years running with the water discharge of 21.7...26.6 km³, the high-water years more often are the solitary cases with the water discharge of 43.4 ...57.5 km³ per year. During the different by the water content years the surface flow of the rivers is prone to great variations. During the average water year the Syr Darya River water resources amount to 35.5 km³ (Table 5).

The Syr Darya River flow considering the regulated flow of water in the reservoirs, the underground inflow and the return waters makes up 47 km³ of water per year, of this amount about 3.4 km³ of water enters the Small Aral Sea.

As a consequence of intensive water diversion for irrigation and other needs, during the last 30 years the natural flow pattern of the Syr Darya Basin's rivers was subject to considerable alterations. In the middle and lower courses there has been increased the flow of the discharged waters and the underground inflow exceeding 10 km³ of water per year. The consumptive water use in agriculture makes up 48%, in industry – 32% and by the communal services – 88% of the total water volume diverted for these needs (Table 6).

The irrigated farming is the major water consumer of the Syr Darya River flow. By 1965 the area of the irrigated lands came to 2,217 thous. ha, and they were located on the hilly plains on the non-saline lands. During the period from 1965 to 1990 the area of the irrigated lands in the Syr Darya Basin increased by 1,200 thous. ha; in the course of this period there were developed the low-yielding mid-saline and highly saline lands of the high-water bed and delta of the river, and the river flow was practically completely used for irrigation (Table 7).

Considerable water overconsumption for the irrigation farming in the Syr Darya Basin was caused by the imperfection of the irrigation canals and discharge network. It cannot be considered normal when the irrigation system efficiency amounts to 0.58 and the water use efficiency on the irrigated areas comes to 0.35-0.40, i.e. more than half of the water diverted from the source of irrigation doesn't reach the plants. As a consequence of this, of the amount 3.313 thous. ha of the reclaimed arable lands over 1.0 mln. ha are in satisfactory condition and require radical improvement of the existing irrigation systems.

At solving this problem much consideration should be given to the introducing of the adaptive-landscape irrigated farming and the ecosystem method of the water distribution in the Syr Darya Basin where the intensive irrigated agriculture is in good progress.

The errors of the agricultural reclamation lie in the fact that on the lands with different agricultural landscapes the irrigation systems were constructed by the standard designs with the irrigation and drainage parameters considering the basic rotating crop. So it happened that on many agricultural landscapes the irrigation and drainage parameters considering the leading rotating crop accepted in accordance with the standard design of the irrigation system are inconsistent with the genesis of the soil.

The requirement concerning the land reclamation to be the adaptive-landscape one should be assigned in the being developed projects where the adaptive-landscape amelioration should be scientifically substantiated and the quantitative criteria for assessment of the landscape state and for its optimization should be developed.

The water in the lower reaches of the Syr Darya River is of unsatisfactory quality for irrigation, and it may be used only on the lands with high drainability of the area at periodical prophylactic washing irrigation preventing from the salts accumulation.

The irrigation water quality influences the water use rates, the crop producing power and the farm products quality. With increase in the mineral salts concentration in the irrigation water over 1.0 g/l, the irrigation rate increases and the potentiality of such water applying for the irrigation needs decreases. It shows up most greatly on the irrigated land areas located in the arid zones with complicated natural and climatic conditions of the South-Kazakhstan and Kzyl-Orda Oblasts of Kazakhstan. Here, with the increase of the irrigation salinization over 1.0 g/l the irrigation rate increases by 10%, at 1,200 mg/l – 20%, and at 1,300 mg/l– 30%, and so on. Thus in Kazakhstan's part of the Syr Darya Basin at the water consumption by the irrigated crops in the volume of 4,260.1 mln. m³ the water delivery to the irrigated areas amounts to 8,251.9 mln. m³ during the irrigation period (Figure 3). The difference in the volume of 3,991.8 mln. m³ of water represents the irrigation losses and the water discharge for the washing irrigation regime preventing the salts accumulation in the soil. The water losses in the main and interfarm irrigation canals made up: $9,881.8 - 8,251.9 = 1,629.9$ mln. m³.

In the context of high salt concentration in the irrigation water that causes increase in the irrigation rate, the discharges of water per unit of the cultivated crop have grown by 20-30%; for the rice they amount to 4,502.8 m³/t and for the cotton – 2,579 m³/t that is 1.5 times higher than the normative one, at the water salinity up to 1.0 g/l (Figure 4).

When the Syr Darya water's salinity is over 1.0 g/l (by the chemical composition such water is referred to Quality Grade III) it may exert adverse effect on the soil fertility and the farm crops yielding ability. The yield capacity of the cultivated crops being irrigated by such water reduces by 25%. This water use over a long period will inevitably cause development of the salinization, soil alkalinization and sodium carbonate formation. As a consequence, productivity of the farm crops cultivated on the irrigated lands in the lower reaches of the Syr Darya River during last decades decreased by 30-40% (Table 8).

Due to the land reclamation in the Syr Darya Basin, the natural-ecological and social-economic conditions were improved by 1.5-2.0 times in the upper and middle courses of the river, and they were aggravated by 2.5-3.0 times in the lower reaches and delta.

The social, economic and ecological damages caused to the lower reaches of the Syr Darya River in the result of the water resources pollution, by the most conservative estimate, amount to \$43 mln. per year (Table 9). The damage was estimated in conformity with the approved in 1983 *The Provisional Standard Procedure on Determining the Economic Efficiency in Implementing the Nature Protection Actions and on Assessing the Economic Damage Caused to the National Economy by the Environment Pollution* (M., 1983).

In compliance with international regulations, Kazakhstan as a sovereign state has the right to claim damage caused by pollution of the water resources by the water consumers (sovereign states of Uzbekistan, Kyrgyzstan and Tajikistan) situated in the upper reaches of the Syr Darya Basin.

It should be noted that in the world there is not a single irrigation system when hundred thousands hectares of the irrigated lands were irrigated by the water with salinity over 1.0 g/l. The operating experience of Kazakhstan in this respect is the unique one but the data available indicate the loss of the soil fertility, positive salt balance of the irrigated lands, overdischarge of the irrigation water, secondary soil salinization and withdrawal of the lands from the farming rotation.

CHAPTER 5. WATER QUALITY MANAGEMENT AND ENVIRONMENT CONSERVATION

A considerable volume of the return waters in the Syr Darya Basin amounting up to 15 km³ per year greatly changes the chemical composition of the water in the river deteriorating its quality downstream the flow.

In the middle course of the Syr Darya River its channel and tributaries have practically become the drain tails where the waste waters from the industrial enterprises and populated localities as well as the return waters from the irrigated fields flow. This situation is aggravated by the fact that on the territory of the adjacent states between Kazakhstan and Uzbekistan the water in the Syr Darya River changes its characteristics so greatly that on the boundary it corresponds by its characteristics to the definition “waste water”.

Within the boundary of Kazakhstan the water in the river doesn't meet the requirements concerning the sources of the drinking water supply by the following indicators (Annex 5):

- At the section upstream the town of Kzyl-Orda: salinization (up to 1.56 MPC), total hardness, sulfates (up to 1.47 MPC), COD, BOD₅, oil products (up to 2.7 MPC), sodium (1.54 MPC), phenols (up to 8 MPC), total iron (up to 2.4 MPC);
- At the section downstream the town of Kzyl-Orda: by salinization (up to 1.43 MPC), total hardness, COD, BOD₅, sodium (up to 1.32 MPC), phenols (up to 7 MPC), oil products (up to 2.2 MPC);
- At the section near the town of Kazalinsk: salinization (up to 1.67 MPC), total hardness, sulfates (up to 1.7 MPC), COD, BOD₅, sodium (up to 1.97 MPC), phenols (up to 6 MPC), oil products (up to 3.47 MPC), total iron (up to 2.67 MPC).

The water of the lower course of the Syr Darya River doesn't meet the requirements concerning the water bodies of the fishery purposes by the following indicators:

- At the Kokbulak section: magnesium (up to 2.69 MPC), sulfates (up to 7.28 MPC), phenols (up to 4 MPC), oil products (up to 20.9 MPC), nitrite nitrogen (up to 3.2 MPC), DDT (up to 9.7 MPC), lindane (up to 21.5 MPC);
- At the Tyumen-aryk section: magnesium (up to 2.19 MPC), sulfates (up to 7 MPC), BOD₅, phenols (up to 4 MPC), oil products (up to 10.8 MPC), nitrite nitrogen (up to 13.2 MPC), DDT (up to 7 MPC), lindane (up to 4.3 MPC);
- At the section upstream the town of Kzyl-Orda: magnesium (up to 2.4 MPC), sulfates (up to 7.4 MPC), BOD₅, phenols (up to 8 MPC), oil products (up to 16 MPC), nitrite nitrogen (up to 13.2 MPC), DDT (up to 14.2 MPC), lindane (up to 6.9 MPC);
- At the section downstream the town of Kzyl-Orda: magnesium (up to 2.28 MPC), sulfates (up to 7.49 MPC), BOD₅, phenols (up to 7 MPC), oil products (up to 13.2 MPC), nitrite nitrogen (up to 35 MPC), DDT (up to 7 MPC), lindane (up to 5.8 MPC);
- At the section of the town of Kazalinsk: magnesium (up to 2.55 MPC), sulfates (up to 8.51 MPC), BOD₅, phenols (up to 6 MPC), oil products (up to 20.8 MPC), nitrite nitrogen (up to 2.9 MPC), DDT (up to 12 MPC), lindane (up to 6 MPC).

The analysis of the data available regarding the Syr Darya River water quality indicates that within the boundaries of Kazakhstan in the river water there are in general contained the residual concentrations of the nitrogen-containing and mineral fertilizers and agricultural chemicals, and the water salinity exceeds 1.2 g/l.

High degree of pollution of the natural waters in the Syr Darya Basin has been caused by the economic activities, and it has been accountable to the lack of regulating the anthropogenic load on the water objects as the ecosystems as well as to the lack of the regulating procedure for applying the nature use limits within the framework of which the industries should perform their activities. The existing concepts on protection of separate reaches of the river intended to be used for concrete purposes don't provide for expanding the water management activity and its regulation for the whole territory of the river basin. Under current conditions of the global anthropogenic impacts on the water projects such approach is evidently insufficient. There is required the ecosystem approach to the water sharing considering the interrelation of diverse natural components capable to reveal the global anthropogenic impacts on the environment including the water projects.

The strategy of the ecosystem water use provides for coordination of the activity and interests of all water users within the limits of the catchment basin as well as the interests of the aquatic fauna as one of the most important users of the clean water.

To implement the ecosystem water use, it is required to establish the adequate economic and legal mechanisms and to develop ecological standards and norms and systems for monitoring the water, soil and farm-production.

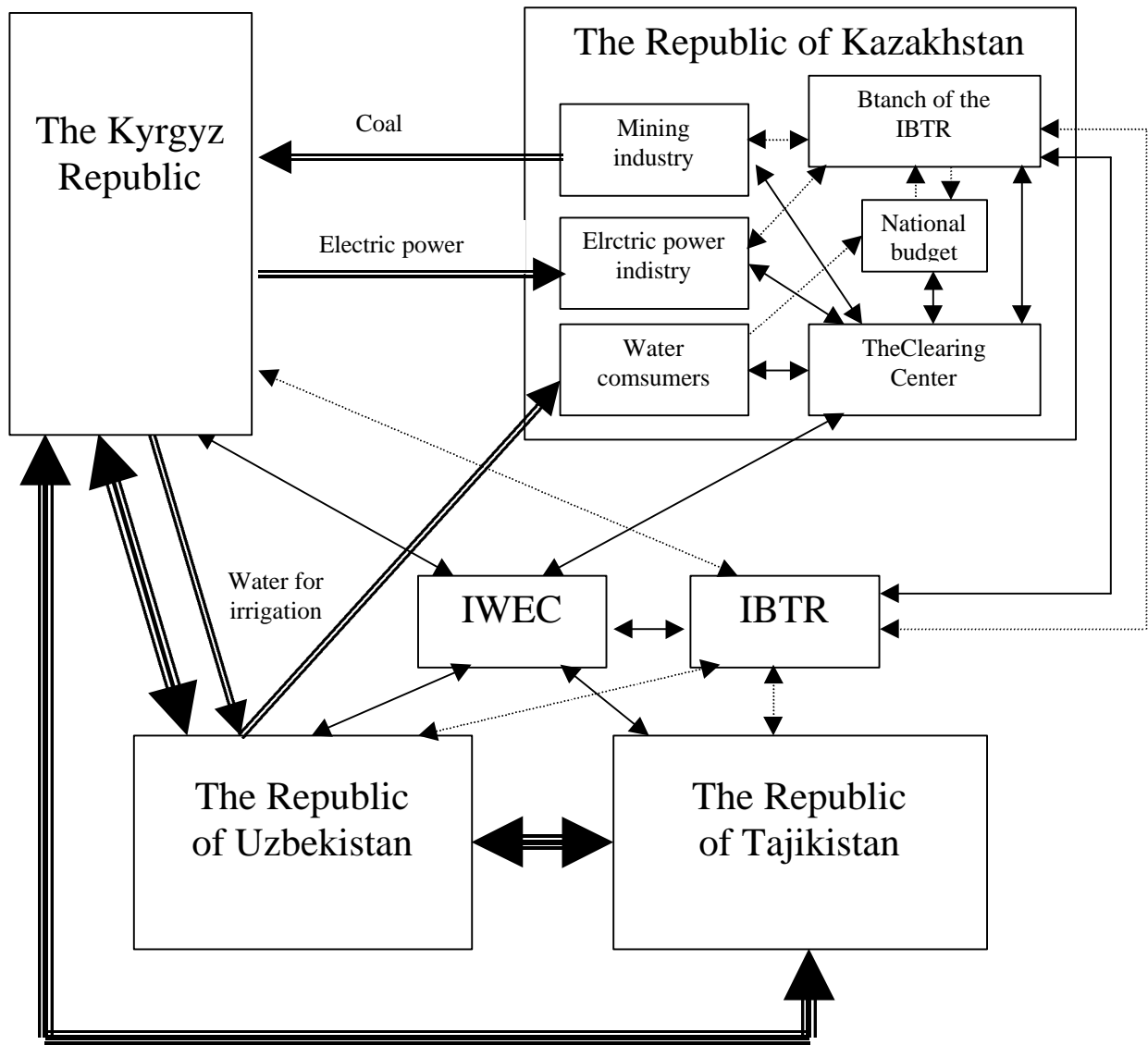
The existing terminology in the area of the water economy is at a considerable degree based on the principle of unlimited use of the water resources and uncontrolled operation of the water sources. In this context the necessity will arise to develop new normative and legal acts which would include the ecological aspect of the problem.





The problem of managing the use of the water resources of the Syr Darya Basin is principally the international one since the most part of the river is considered as the international river both according to the conditions of several states location on the territory of the watersheds and according to the conditions of the incoming river flow. In addition, this problem is referred to the international ones in the context of qualitatively new relations between the former Union Republics that now acquired the status of independent states. Thus it is critically important to assess the economic and political interests of every independent territorial unit situated on the watershed area of the river basin, to reveal the interests and conflict situations, to estimate possible ways for their settlement taking into consideration the experience available.

Therewith it is hardly possible to obtain something constructive from the water use experience of some remote historical time when the wars were the only way to settle the conflict situation. The more useful has been the experience of the last decades when the international agencies were established that were functioning effectively, and the interstate relations has been gaining true equal forms.

ANNEXES TO THE REPORT

Problems of Regulation, Management and Conservation
of the Water Resources of the Transboundary Syr Darya River
(To Elaborating the Position of the Republic of Kazakhstan
Concerning the Problems of Rational Use and Management
of the Syr Darya River Water Resources)



- Interstate turnover of commodities 
- Flows of commodities and services 
- Management and information flows 
- Flows of money 

New Scheme of the Resources Redistribution (Complete Version)

Table 1

Formation and Interstate Distribution
of the Average Annual Flow of the Syr Darya River

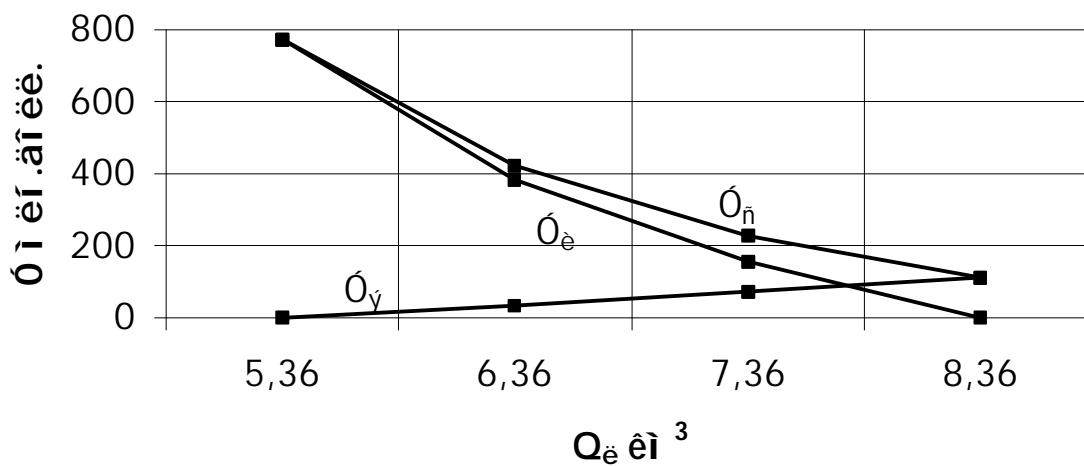
##	States	Formation		Distribution	
		km ³ /year	%	km ³ /year	%
1.	Kyrgyzstan	27.4	74	3.3	9
2.	Usbekistan	4.1	11	19.7	53
3.	Tajikistan	1.1	3	2.6	7
4.	Kazakhstan	4.5	12	11.5	31
	Total	37.1	100	37.1	100

Table 2

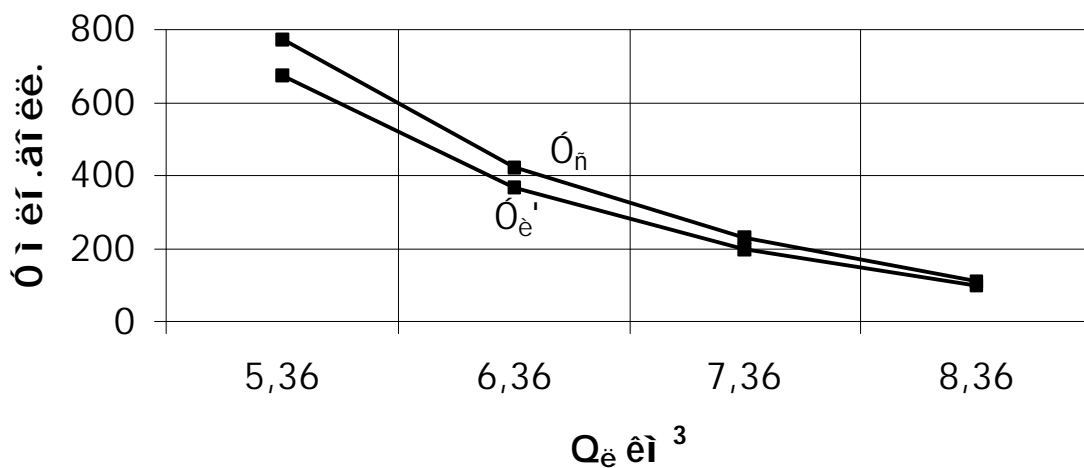
Integrated Indicators of the Syr Darya River
Flow Distribution (km³)

Years	Inflow to the delta head	Delta's water consumption	Inflow to the Small Aral Sea	Water consumption by the sea (evaporation, impoundment)	Flow to the Big Aral Sea
1988	6.84	1.72	5.12	1.97	3.15
1989	4.35	1.15	3.20	1.92	1.28
1990	3.59	1.10	2.49	1.57	0.92
1991	3.69	1.05	2.64	1.50	1.14
1992	4.47	1.08	3.39	3.39	0.00
1993	9.50	1.70	7.80	5.45	2.35
1994	9.27	1.61	7.66	2.75	4.91
1995	5.87	1.25	4.62	2.75	1.87
1996	4.71	1.01	3.70	2.75	0.95
1997	5.23	1.17	4.06	2.19	1.87
Average value	5.75	1.28	4.47	2.62	1.85

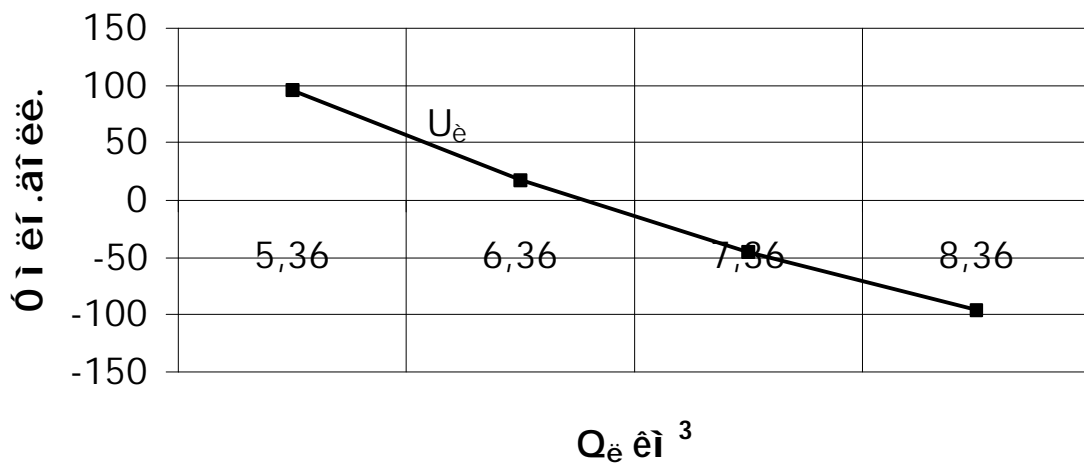
As to Optimization of the Toktogul Reservoir Use for Irrigation and Power Purposes



a) Isolated decision



b) Trade-off decision



c) Compensation for damage

Figure 1

Table 3

Regime Characteristics
of the Toktogul Reservoir

##	Indicators	Parameters	
		km ³	%
1.	Average annual inflow to the reservoir	11.4	100
	Incl.: summer inflow	8.91	78
	winter inflow	2.49	22
2.	Average annual reservoir losses	0.02	
3.	Average annual idle discharges from the reservoir	0.66	
4.	Average annual reservoir firm yield	10.72	100
5.	Irrigation regime of the drawdown		
	Summer release	8.36	81
	Winter release	2.36	29
6.	Power regime of the drawdown		
	Summer release	5.36	50
	Winter release	5.36	50

As to Optimization of Transboundary Transfer of the Salts by the Syr Darya Flow

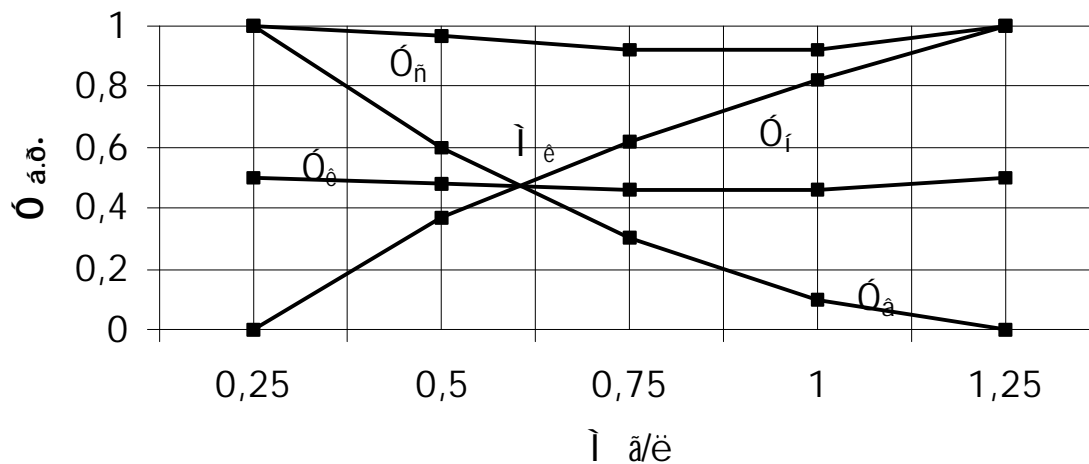


Figure 2

Table 4

As to Optimization of the Toktogul Reservoir Use
for the Irrigation and Power Purposes

##	Indicators	Versions of the growing season release $Q_{\bar{e}}$ (km ³)				
		5.36	6.36	6.56	7.36	8.36
1.	Irrigation regime damages at the isolated decision: absolute $\acute{O}_{\bar{e}}$ (mln. dollars) Relative $\acute{o}_{\bar{e}}$ (á.đ.)	770 1.00	385 0.50	308 0.40	154 0.20	0 0.00
2.	Power regime damages at the isolated decision absolute $\acute{O}_{\bar{y}}$ (mln. dollars) relative $\acute{o}_{\bar{y}}$ (á.đ.)	0 0.00	36 0.33	44 0.40	74 0.67	110 1.00
3.	Aggregate damages of the irrigation and power complex absolute $\acute{O}_{\bar{n}}$ (mln. dollars) relative $\acute{o}_{\bar{n}}$ (á.đ.)	770 1.00	421 0.55	352 0.46	228 0.30	110 0.14
4.	Irrigation damages at the trade-off decision absolute $\acute{O}_{\bar{e}}'$ (mln. dollars) relative $\acute{o}_{\bar{e}}'$ (á.đ.)	674 0.88	368 0.48	308 0.40	200 0.26	96 0.125
5.	Power damages at the trade-off decision absolute $\acute{O}_{\bar{y}}'$ (mln. dollars) relative $\acute{o}_{\bar{y}}'$ (á.đ.)	96 0.88	53 0.48	44 0.40	28 0.26	14 0.125
6.	Compensation for damages (mln. dollars) Irrigation $U_{\bar{e}}$ Power $U_{\bar{y}}$	+96 -96	+17 -17	0 0	-46 +46	-96 +96

Table 5

Dynamics of the Available Cumulative Surface Water Resources
of the of the Syr Darya Basin, km³ /26/.

Years	Resources of the natural flow in formation zone	Flow probability, %	Return waters	Resources total
1960-1961	43.4	15	10.5	54.3
1961-1962	26.2	92	10.0	36.2
1962-1963	26.6	92	11.8	38.4
1963-1964	33.6	55	14.1	47.7
1964-1965	38.0	25	12.2	50.2
1965-1966	25.8	93	8.9	34.7
1966-1967	41.0	16	13.5	54.5
1967-1968	31.8	63	13.0	44.8
1968-1969	36.2	40	15.3	51.5
1969-1970	57.5	10	15.9	73.4
1970-1971	38.6	24	16.8	55.4
1971-1972	34.6	45	16.3	50.9
1972-1973	33.4	55	17.7	51.1
1973-1974	38.3	25	15.9	54.2
1974-1975	21.7	99	13.0	34.7
1975-1976	24.4	95	12.5	36.9
1976-1977	28.0	73	15.2	43.2
1977-1978	29.6	70	15.5	45.1
1978-1979	31.8	63	16.2	48.0
1979-1980	38.5	22	16.4	54.9
1980-1981	33.7	55	16.7	50.4
1981-1982	33.0	60	15.8	48.8
1982-1983	25.7	92	21.3	47.0

Table 6

Volumes of Water Consumption by Industry, Communal Facilities,
Fishery and Agriculture in the Syr Darya Basin

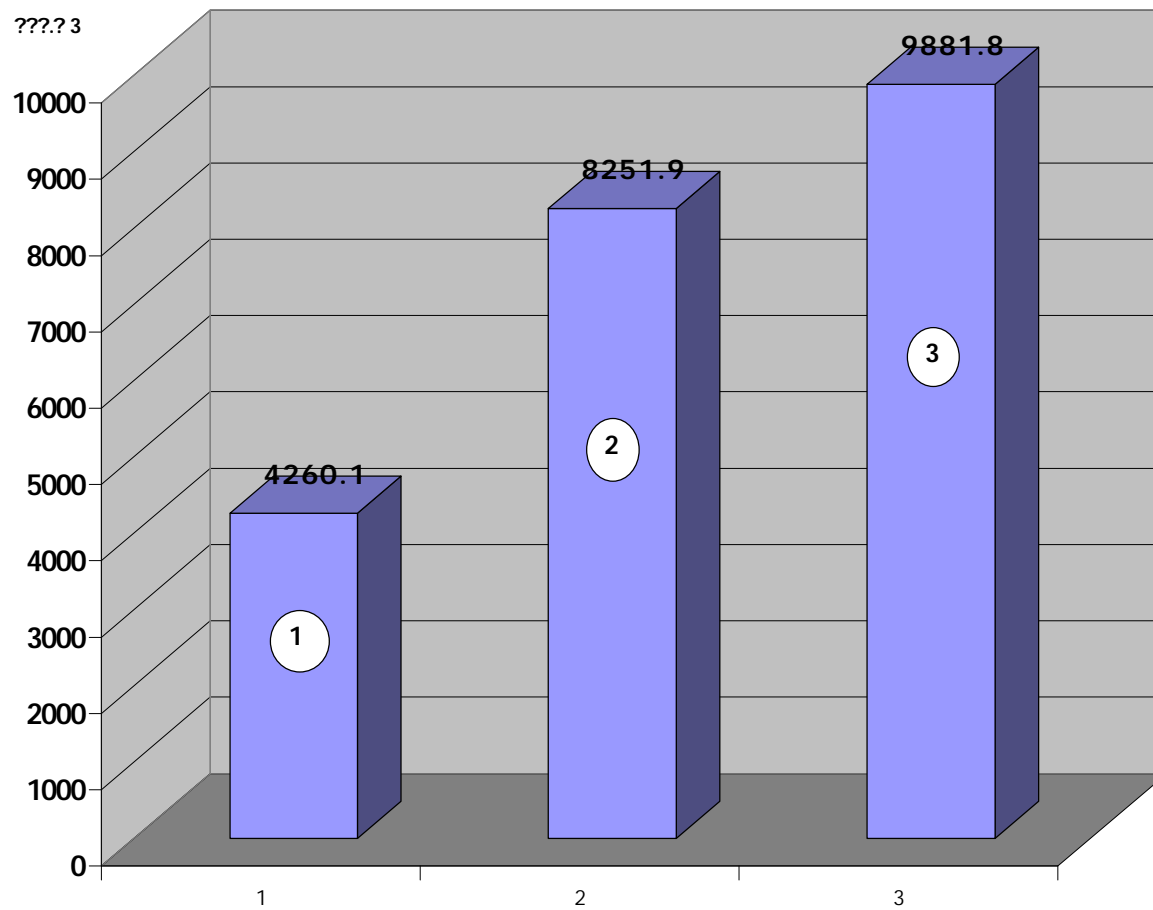
Irrigation area	Water consumption by industry and communal facilities, mln. m ³ /year		Water consumption for fishery , mln. m ³ /year		Water consumption for agriculture, mln. m ³ /year		Total	
	Total volume	Including consumptive water use	Total volume	Including consumptive water use	Total volume	Including consumptive water use	Total volume	Including consumptive water use
Upper reaches of Naryn	62	32	-	-	-	-	62	32
Fergana Valley	1382	621	29	9	16704	7311	18115	7941
Middle course of Syr Darya	279	126	374	54	5935	3610	6588	3790
CHAKIR	1500	588	-	-	4142	2071	5642	2659
ARTUR	300	148	-	-	2560	1054	2860	1193
Lower reaches of Syr Darya	164	83	3505	3080	3931	1984	11100	8647

Total by the Basin	3687	1111	3908	3143	33272	16021	44367	24262
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Table 7

Area of the Irrigated Lands Under the Cultivated Crops
In the Syr Darya Basin (thous. ha).

Republics	Total area	Cotton		Grain crops (rice, wheat)		Fodder crops (lucerne, maize)		Gardens, vegetables, melon fields	
		Area	%	Area	%	Area	%	Area	%
Uzbekistan	1900	877	46	370	20	435	23	218	11
Tajikistan	260	94	36	30	12	22	9	114	44
Kyrgyzstan	424	30	7	104	25	169	40	121	29
Kazakhstan	782	120	15	267	34	270	35	125	16
Total:	3364	1121	33	771	23	896	27	578	17



- 1 – water supply to the irrigated fields;
- 2 – water supply to the farms;
- 3 – water diversion by the irrigation systems from the surface water resources.

Figure 3. Water Diversion by the Irrigation Systems of the Syr Darya Basin and Water Supply to the Farms and to the Irrigated Fields in the Republic of Kazakhstan

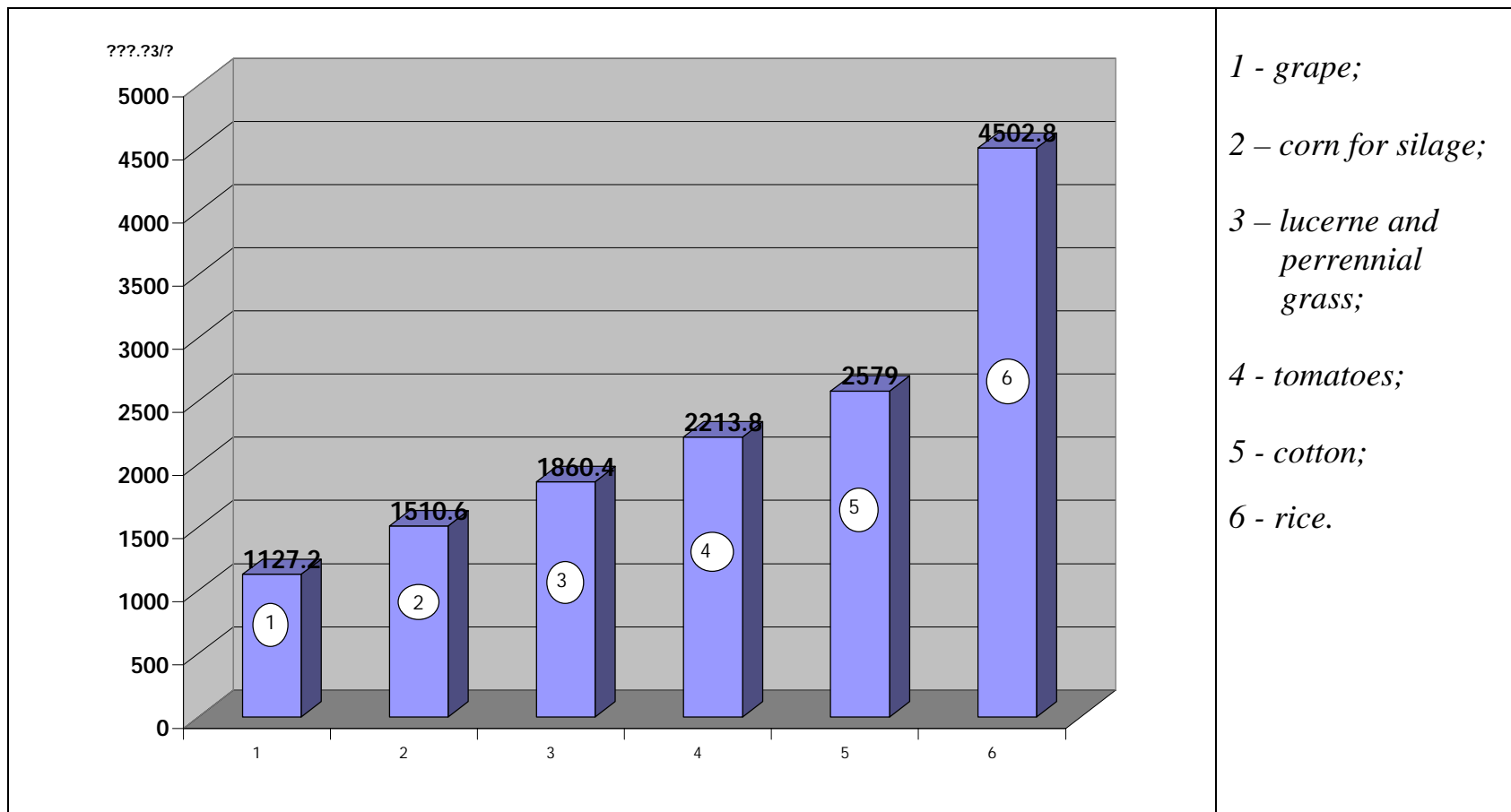


Figure 4. Water Consumption per One Ton of the Produce

Table 8

Natural and Ecological Estimation of the Cultivated Crops Productivity
in the Syr Darya Basin

Water resources region	Cultivated crops	Natural irrigation rate, thous. m ³ / ha		Actual irrigation rate ($\hat{I}\hat{\delta}$), thous. m ³ / ha			Yield (Y), centner			$\hat{E}\hat{a} = \hat{I}\hat{\delta}/Y_i; \hat{i}^3 / \text{centner}$		
		$\hat{D}=50\%$	$\hat{D}=95\%$	1965	1980	1990	1965	1980	1990	1965	1980	1990
Upper reaches of the Naryn River	Spring cereals	3.4					19.8	33.8	36.3	338.4	269.2	234.1
	Sugar beet	6.1		6.7	9.1	8.5	342	367	219	19.6	24.8	38.8
	Grass	6.9					29.5	37.7	39.5	227.1	230.4	215.2
Fergana Valley	Cotton	5.7					27.1	30.7	29.8	793.4	599.3	600.7
	Grass	7.6		21.5	18.4	17.9	28.1	45.2	54.4	765.1	407.1	329.0
	Potato	7.5					70	148	176	307.1	124.3996.	101.7
	Vegetables	7.5					133	190	205	161.7	8	87.3
Middle course of the River	Cotton	5.9					25.1	31.3	30.4	458.2	479.2	365.1
	Grass	7.8		11.5	15.0	11.1	33.5	56.0	57.5	343.3	267.9	193.0
	Vegetables	7.6					124	192	209	92.7	78.1	53.1
	Potato	7.6					70	89	95	164.3	168.5	116.8
Lower course of the River	Cotton	7.850	9.550				23.5	28.3	18.8	391.5	349.8	436.1
	Grain corn	6.15	7.800	9.2	9.9	8.2	19.7	66.3	59.4	467.0	149.3	138.0
	Grass	9.50	11.50				19.0	24.8	26.0	484.2	399.2	315.4
	Rice		29.6	46.4	38.9	34.7	32.4	48.8	49.2	1438	797	705

Table 9
Social and Economic Damage from the Water Pollution in the Lower Reaches of the Syr Darya Basin

1	Type of damage	Unit of measur.	Parameters of the object			Quantitative parameters of the damage					
						1965 ä.		1980 ä.		1995 ä.	
			1975	1980	1995	KZT mln.	\$ thous.	KZT mln.	\$ thous.	KZT mln.	\$ thous.
1	2	3	4	5	6	7	8	9	10	11	12
1	Economic damage:										
	- Losses from the products quality decrease;	thous. ha	137.5	659.0	563.0	10.72	141.1	102.8	1325.6	175.7	2311.2
	- Losses from uncomplete receipt of the products;	thous. ha	137.5	659.0	563.0	21.45	282.2	257.0	3385.6	307.4	4044.7
	- Costs for restoration or maintenance of the normal state of environment;	thous. ha	30.5	158.3	130.2	3888.75	511.6	20183.2	26556.9	16600.5	21842.8
	- Costs for liquidation of the water resources pollution ;	ki ³	3.5	8.0	6.2	4.50	59.30	10.30	135.40	7.98	105.00

1	2	3	4	5	6	7	8	9	10	11	12
	Sosial and economic damage:										
	- Losses in the health protection and social security caused by the sickness rate growth;	thous. people	422.2	450.0	560.0	1.542	20.3	10.03	132.00	14.28	187.93
	- Losses in the consequence of migration caused by deterioration of the environment state;	thous. people	53.2	57.4	61.9	5.32	70.0	5.74	75.52	6.19	81.44
	- Costs for additional vacation in consequence of unsatisfactory state of the environment	thous. people	212.8	229.6	247.6	638.4	84.00	688.8	90.63	742.80	97.74

1	2	3	4	5	6	7	8	9	10	11	12
	Social damage:										
	- aesthetic losses caused by deterioration of the environment ;	ha	7600	20000	29600	14.07	185.2	185.2	487.4	54.82	721.3
	- losses caused by degradation of the ecological conditions of the vital activity of the members of the community;	thous. people	532.0	574.0	619.0	37.5	493.4	40.46	532.3	43.63	574.12
	- psychological losses caused by unsatisfactory state of the recreation zones	thous. people	532.0	574.0	619.0	120.0	1578.9	540.0	7105.3	1000.0	13157.9
	TOTAL:					4742.25	3426.0	21875.37	39853.65	18953.30	43124.13