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Environmental Policy and Technology Project

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NEW INDEPENDENT STATES

FIELD REPORT

Summary of the Seminar on Water Pricing in Central Asia

May 1996

Delivery Order 8, Task A

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

Prepared by:
Environmental Policy and Technology Project
Central Asian Regional Office
For the New Independent States of the former Soviet Union
A USAID Project Consortium Led by CH2M HILL

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Section 1
Introduction

1.1 Background

The Environmental Policy and Technology (EPT) Project in Central Asia is devoted to assisting the newly independent Central Asian Republics in working together to improve environmental conditions of the Aral Sea Basin. The Regional Cooperation Program, funded under Delivery Order 8, is designed to foster regional cooperation among the five Central Asia Republics of Kazakstan, Kyrgyz Repulic, Turkmenistan, Tajikistan, and Uzbekistan in improving regional water management practices.

USAID

~~The EPT~~ project began implementation of the Regional Cooperation Program in the spring of 1994. It supported a study tour of 22 Central Asian water management professionals to meet water management officials in the United States. While on the study tour, these CAR officials generated a list of priority topics and issues for which they would like to receive further assistance in from the United States. In response, Delivery Order Eight of the Environmental Policy and Technology Project was designed to promote regional cooperation in several ways: through sponsorship of workshops and seminars, through funding of local demonstration projects in water management, and through providing technical assistance in the area of water resources management and policy development.

The USAID Environmental Policy and Technology Project has sponsored three workshops. In December 1994, it held a workshop on Information Management in Tashkent, and in May 1995, it held a workshop on Water Policy and Management in Ashgabat. The seminar on Water Pricing in Central Asia is the third workshop organized under this program.

The Aral Sea crisis threatens the environmental, economic and social well being of all five Central Asian Republics. Presidents of the five Central Asian republics ecognize that environmental policies and economic development are inextricably linked and that economic stability rests upon social well-being. They signed an agreement in September of 1995 to make region-wide progress in resolving the human and environmental consequences of the problems of the Aral Sea. The Presidents agreed to search for economically driven methods of regulating water use to promote increased efficiency, thereby reducing the environmental and human dimensions of the Aral Sea crisis.

The topic of water pricing is a key target area for assistance under the regional cooperation component of USAID's Aral Sea Program. At present there is very limited experience with the use of water charges of any kind in the region, and is this seminar was one of the first opportunties for exchange of information among the five republics and with countries outside of the region on this subject. Fortunately, there is increasing interest in the topics as CAR water management authorities are seeking measures to improve the efficiency of water use and exposure to the revenue generating aspects of water prices as a means to cover the costs of providing water services.

1.2 Participation and Approach

The focus of the water pricing seminar was to develop effective regional water pricing strategies for the Central Asian Republics. The seminar objectives were to identify priority issues for water pricing in the region, introduce objectives and methods for water pricing, identify key issues for resolution, identify key players and stakeholders who are needed for reaching regional water management agreements, and develop an action plan for reaching a CAR consensus on regional water pricing issues.

The United States Agency for International Development (USAID) and the Government of Kyrgyz Repulic's Institute of Water Problems and Energy jointly sponsored the seminar, with organization and management provided by the USAID Environmental Policy and Technology Project. It represented one of the first opportunities for the Central Asian Republics to follow-up on agreements reached in Nukus.

Representatives from water management and environmental entities throughout the region attended a 3 day gathering in Bishkek, Kyrgyszstan to discuss water pricing and its application to CAR water management issues. Participation was excellent. All discussions maintained a constructive atmosphere for the exchange of information and search for mutually agreeable and beneficial approaches to water pricing within the five republics.

In total there were 42 CAR participants and 12 foreign experts in water pricing and water resources mangement issues. The participants represented environmental and water management authorities at both technical and decision-making levels. Three U.S. water pricing experts from Utah State University, the resident advisor/economist from the Harvard Institute of International Development/Almaty, the USAID resident economist/advisor to the Ministry of Economy of the Kyrgyz Repulic, and a senior natural resources economist from the International Resources Group in Washington, D.C. shared their knowledge of U.S. and other countries' experience with water pricing schemes.

Background presentations on water pricing methods were followed by a summary of each country's experience with and perspectives on water pricing as part of a broader set of policies to improve water management within the Aral Sea Basin. A dialogue among workshop participants followed the technical and country presentations in which consensus was sought and achieved on basic concepts relating to water pricing, the appropriate roles of country-specific versus regional work on the subject, and a plan of follow-up actions.

The EPT Regional Cooperation Working Committee of USAID's Aral Sea Program met each evening to assess progress, provide feedback to organizers, and guide the seminar's direction. It held a more lengthy concluding session to review the seminar findings and make recommendations for future action.

Section 2
Outcome

2.1 Action Plan Consensus

Much of the seminar discussion centered on the need to separate those issues which are country-specific from those which are regional in nature. On this basis, two types of follow-up actions were identified. The first type of follow-up action relates to a comparative analysis of water pricing experiences in the five republics to promote better understanding of alternative approaches within the CAR context. Participants agreed that two comparative analyses should be conducted:

- Documentation and analysis of the existing country-specific experience with water pricing schemes; and,
- Examination of existing water use measurement approaches as an aid in the eventual implementation of water pricing schemes.

The second type of follow-up action entails conducting analyses to support the eventual negotiation of regional water allocation agreements. Three urgently needed analyses were identified:

- A review of applicable methods for pricing water based on the costs and demand associated with the provision of services;
- An economic evaluation of the operational regimes of multi-purpose dams (hydropower, irrigation, and other uses) servicing more than one republic; and,
- An examination of the possibility of using pricing schemes to address upstream-downstream changes in water quality.

At the wrap-up meeting it was agreed that a working group focusing on water pricing committee will be established to carry out the follow-up activities under the oversight of the Regional Cooperation Working Committee. EPT has made recommendations to USAID for funding three applied demonstration projects which support the work of the water pricing group. Economists from the region and other regional entities may also be involved, as needed. Staff and consultants of the NIS Environmental Policy and Technology Project will provide technical assistance as needed to the Water Pricing Working Group.

2.2 Donor Coordination

The seminar organizers expended considerable effort to ensure that the water pricing seminar and other USAID EPT Project activities are coordinated with the Aral Sea project efforts of other international donors. There was some concern that the USAID activities may need to be more closely coordinated with those that fall under program 1.1 (Regional Water Management Strategy) and Program 1.2 , Improvement of the Efficiency and Operation of Dams. However, the seminar participants agreed that there was no issue of overlap with such activities and that this effort would complement and enhance the work of program 1.1 or 1.2 since funding had not

been secured to fund many of the activities the water pricing seminar resolution proposed. Close coordination of EU/WARMAP activity has also been established.

Section 3
Conclusions

3.1 Anticipated Impacts

The comparative analysis of experience in each of the five republics, together with the analyses of regional pricing and cost schemes will support efforts to achieve regional agreements on water sharing and allocation. Considerable effort is still required to better define the options for trade-offs of potential regional agreement on water sharing and allocation. The water pricing follow-up activities outlined in the Water Pricing in Central Asia Seminar Resolution will make a significant contribution to these efforts.

3.2 Anticipated Needs

The USAID-supported water pricing initiative stands on its own as an important contribution to improved understanding of market-based water management policies and regulatory approaches applicable to the region. However, this effort and follow-up activities will build capacity to implement change for the benefit of the entire region. To ensure this, a forum for reaching consensus on results and recommendations evolving from pricing activities must be developed. Consideration should be given to using the USAID Water Pricing activities to enhance the likelihood of the success of ICAS or other interstate institutions in achieving long term legal agreements on water sharing and allocation within the region.

Section 4
Recommendations

4.1 Convene a Water Pricing Technical Working Group

As noted above, a principal recommendation of the meeting was that the EPT Project should convene a Water Pricing Technical Working Group to investigate and reach consensus on the following five high priority issues:

1) Comparative analysis of each republic's experience with water pricing schemes;
2) Comparative analysis of each republic's experience with water allocation measurement approaches as they relate to the implementation of water pricing schemes;
3) Economic evaluation of the operational regimes of existing irrigation and power generating reservoirs considering their effects on the Aral Sea;
4) Cost and demand based pricing schemes for both existing and new multi-purpose projects affecting more than one republic; and,
5) Approaches for charging water prices to compensate for changes in water quality.

4.2 Award EPT Applied Demonstration Projects Related to Water Pricing Activities

Three applied demonstration projects on the following topics should support investigation of the five topics above:

- "Scientifically-Based Methods of Water Pricing" Principal investigators include Dr. Dyushyen Mamatkanov of the Institute for Water Problems and Hydroelectric Energy, Kyrgyz Repulic; , Dr. Albert Raffikov, Department Head, Executive Committee of the Interstate Council for the Problems of the Aral Sea, Uzbekistan; and Dr. Victor Boltov, Deputy Minister, Ministry of Economics and Foreign Relations of Tajikistan.

- "Pricing Water During Transition to Paid Water Use in the Republics of Central Asia." Principal Investigators include Dr. Victor Dukovney of the SANRI, and Chair of ICAS/World Bank Program 1; Dr. Nabi Nasirov, General Director SPA TRIHR, Tajikistan.

- "Economic Damage Evaluation in Water Use." Principal Investigator is Dr. Moses Sarkisov, Director of Turkmenigprovodkhoz.

4.3 Water Pricing Technical Working Group Membership

Representation on the Water Pricing Technical Working Group should include at least two representatives from each Central Asian Republic. To the extent possible, membership selection could be driven by the need to link with those who will use new water pricing concepts in achieving regional agreements on water allocation. Researchers of the three USAID/EPT-funded applied demonstration projects. This will maximize interaction among researchers and offer greater opportunity for developing consensus as project work evolves. However, pariticipation of economists should also be ensured.

4.4 Supply U.S. Technical Assistance in Water Pricing

The EPT project should provide U.S. based technical assistance to the CAR's in exploring the five issues listed in Section 4.1.

4.5 Provide Forum to Integrate Results

The EPT project should provide forums for interdisciplinary interaction on water pricing and other water management topics within the context of the Environmental Policy Technology Project. The EPT Project should plan to elevate output of the Water Pricing Technical Working Group to high level regional officials in the context of future project activities and in suppor or regional efforts to reach agreements on the use and allocation of water.

4.6 Provide Forum to Elevate Water Pricing Recommendations

The EPT Project should plan and execute a program for making the ultimate product of the water pricing effort and other EPT project outputs useful to future efforts of USAID and international donors.

Appendix A
Resolution of the Seminar on Water Pricing in Central Asia

The Institute of Water Problems and Energy of the National Academy of Science of the and the U.S. Agency for International Development's (USAID) Environmental Policy and Technology Project (EPT) co-sponsored the first seminar on Water Pricing in Central Asia. Thirty participants from all five Central Asian Republics were invited. U.S. experts presented methods and models for developing water pricing strategies, based on experience in other countries. Seminar participants agreed that water pricing is an important potential economic tool for improved water management in Central Asia, and that the work of the EPT Project in this area is not duplicating the efforts of other international organizations. They resolved to continue a dialogue on water pricing issues over the course of the next year to develop an improved understanding of pricing methods and to develop an agenda for the wide application of pricing schemes.

Plan of Action

The USAID Aral Sea Program's EPT Regional Cooperation Working Committee members coordinated input of their Republic delegations. They managed the consensus-building process for reaching agreements on key water pricing concepts and action plan development. The members of the Working Committee, who represented attendees from their respective republics, now agree to form a Regional Technical Working Group on Water Pricing in Central Asia. The Technical Working Group will be responsible for directing developing methodologies which address the issues outlined below:

1. Comparative analysis of each Republic's experience with water pricing schemes;
2. Comparative analysis of each Republic's experience with water allocation measurement approaches as they relate to the implementation of water pricing schemes;
3. Economic evaluation of the operational regimes of existing irrigation and power generating reservoirs considering their effects on the Aral Sea
4. Cost and demand based pricing schemes for both existing and new multi-purpose projects affecting more than one republic
5. Approaches for establishing water prices to compensate for changes in water quality.

The Working Committee will oversee and guide the work of the Technical Working Group. In addition, the Working Committee will ensure that the recommendations which the Technical Working Group puts forward are introduced to the appropriate organizations, institutions, and policy-makers who can use them as a basis for reaching agreements on water pricing and sharing in Central Asia.

Priority Issues on Water Pricing in Central Asia

As a product of the seminar, participants generated prioritized regional and country-specific issues related to water pricing. Regional recognition of the importance of these issues, which are

outlined below, provide a starting point for long-term regional consensus development on water pricing in Central Asia.

Regional

- Comparative review of existing / proposed water charge systems in countries of the region,
- Water pricing based on a component of costs associated with water as a natural resource,
- Defining tariffs for the service of supply of water resources for irrigation based on average use and excess use,
- Use of interstate tariffs as a basis for compensation in a regional water agreement,
- Comparative review of existing systems of water monitoring, and measuring as they relate to the introduction of water pricing mechanisms

Uzbekistan

- Establishment of a legal foundation for interstate water use,
- Establishment of policies and mechanisms for state support of rational water use,
- Treaty among 5 republics on hydropower and other energy, and on water use,
- Development of unified methods for water pricing and payment for polluting water resources in all the regions of the republics,
- Introduction of a comprehensive system of charges based upon rational/economical use of water resources,
- Consideration of surface water resources as the collective property of all the republics, and establishing water use rights based on interstate agreements, and
- Cooperation among water management entities in order to develop economic mechanisms for establishing water prices through development of a functioning model by 1996.

Kyrgyz Republic

Development of pricing methodologies for :

- Payment for water pollution,
- Determining defined tariffs for fresh ground water and surface water supply services,
- Determining tariffs on water irrigation delivered to other republics from the water reservoirs situated on international rivers, and
- Calculating the socio-economic effects of a depleted water supply and potable water quality on the populations in the Aral Sea basin.

Turkmenistan

- Lack of supply of irrigation networks with systems for Hydrometeorological monitoring and metering of water use,
- Insolvency of agricultural water users (as it affects water pricing),
- The absence of a reliable market mechanism in the use of water resources, and
- Incomparability of monetary systems.

Kazakstan

- Development of a methodology for calculating the cost of water as a service and as a resource for growth on the national and regional levels,
- Development of a methodology for developing a quota for water supplied to the Aral Sea, which is delivered among the republics without cost,
- Development of a methodology of determining the amount of water flow released to the downstream republics, and the means of evaluating its cost,
- Development of a methodology for calculating the degree of economic and environmental damage from lack of sufficient supply of water and decreases in water quality, and
- Equip water regulation systems with modern devices of water measurement and monitoring and automization of management of water resources.

Tajikistan

- Participation in the organization of the systems of monitoring ecologically endangered international bodies of water,
- Development of a unified regional methodology for water pricing,
- Address international significance of hydropower facilities - built for downstream countries,
- Development of a unified methodology for determining the regimes for irrigation of agricultural crops in Central Asia, and
- Development of quality standards for irrigation water.

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AGREED TO:

The Regional Cooperation Working Committee Members adopt this resolution this _____ day of February, 1996.

_____
Dr. Konjukov
Deputy Chairman
Committee for Nature Protection
The Republic of Uzbekistan

_____
Dr. Kenshimov
Department Head
Water Resources Department
Committee on Water Resources
The Republic of Kazaskstan

_____
Dr. Niyazov
Deputy Head
Department of
Ministry of
The Republic of Turkmenistan

_____
Dr. Kurbanov
Deputy Minister
Ministry of Ecology
The Republic of Tajikistan

_____
Dr. Bozof
Chief Ecological Expert
State Committee on Nature Protection
The Kyrgyz Republic

_____
Dr. Albert Raffikov
Department Head
Executive Committee
Interstate Council for the Problems of the Aral Sea

_____
Dr. Mamatkhanov
Director of Institute of Water Problems and Hydroenergy

Appendix B
List of Participants

Kazakstan

Anatolyi Stepanovich Baranov
Institute "Kazgiprovodhoz"
Chief Project Engineer
Almaty

Valery Nantoliyevich Nesterenko
Ministry of Ecology and Bioresources
Deputy Head of the Departments of Scientific and Technical Problems, Economics and Natural Resources
Almaty

Muratbek Rakhmetbayevich Kasenov, Head
Zhambyl School of Entrepreneurship
Economics Department
Zhambyl

Marina Semyonovna Snegiryova
Ministry of Health
Head Municipal Water Supply Division
Republic Sanitary and Epidemiological Station
Almaty

Amirkhan Kadirbekovich Kenshimov
Committee on Water Resources
Head of the Department of Water Resources
Almaty

Kyrgyz Republic

Sabirzhan Toktosunovich Abdykerimov
Ministry of Health
Head of Administration of Sanitary/Epidemiological Service
Bishkek

Klimakova Galina Nikolaevna
Ministry of Economy
Bishkek

Dzurabai Muladzhanov
Supreme Soviet
Chief Consultant on Agricultural Issues
Bishkek

Kadirbek Dyushenaliyevich Bozov
State Committee for Nature Protection
Chief State Environmental Expert
Bishkek

Kubanychbek Muhambetovic Kulov
Director
Institute of Irrigation
Bishkek

Dyushen Mamatkanov
Director
Institute of Water Problems and Hydroelectric Energy
Bishkek

Alexei Grigorievich Zyrayanov
Director of Technical Services
Energy Holding Company of Kyrgyz Repulic
Bishkek

Erkin Oralbaev
Expert on Water Resources
President's Institute of Strategic Studies
Bishkek

Kuzma Ivanovich Shavva
Head Researcher
Institute of Water Problems and Hydroelectric Energy
Bishkek

Tajikistan

Nurullo Ashurov
Ministry of Melioration and Water Management
First Deputy Minister
Dushanbe

Victor Vasilievich Boltov
Ministry of Economics and Foreign Economic Relations
Deputy Minister
Dushanbe

Abdukarim Kurbanovich Kurbanov
Ministry of the Environment
Deputy Minister
Dushanbe

Munimdzhan Abdusamadov
State Control for Use and Protection of Water Resources
Head of Specialized Inspection
Dushanbe

Turkmenistan

Sapar Ataeyvich Atayev
Ministry of Natural Resources Use and Environmental Protection
Department Head
Ashgabat

Omar Niyazovich Niyazov
Ministry of Reclamation and Water management
Deputy Head of Hydrogeological RECLAMATION Field Studies and Projects
Ashgabat

Vladimir Babayevich Kuliyev
Ministry of Health
Leading Specialist
Ashgabat

Larisa Alekseyevna Sosnitaskaya Academy of Sciences of the Republic of Turkmenistan
Institute of Economics
Leading Researcher
Ashgabat

Uzbekistan

Dr. Marat Nasirovich Akhundi
President of the Club of Economists
Tashkent

Saidasim Seidrahmanovich Mirazaev
Head Of "GLAVVODCONTROL"
State Committee of Nature Protection
Tashkent

Ritta Izrailovna Gutnikova
Deputy Director
Tashkniivodhoz
Tashkent

Dr. Albert Raffikov
Head of Department
Executive Committee
Interstate Council for the Problems of the Aral Sea

Favoris Kadyrevich Kayumov
Director
Institute of Economic Reforms in Agricultural Production

Yadgar Sabitov
Head of Division of Economics
Ministry of Reclamation and Water Management
Tashkent

International Organizations

Dr. Geoff Rothwell
European Union
Tashkent Uzbekistan

Dr. Stuart Gunn
European Union
Tashkent Uzbekistan

B

United States

Dr. Michael Boyd
Resident Advisor
Harvard Institute for International Development
Almaty

The Honorable Eileen Malloy
United States Ambassador to Kyrgyz Repulic
United States Embassy Kyrgyz Repulic
Biskek

Ms. Barbara Britton
Regional Policy Advisor
Environmental Policy and Technology Project
Almaty

Dr. David McCauley
Senior Natural Resource Economist
International Resources Group
USA

Mr. Bryan Bushley
International Affairs Specialist
Environmental Policy and Technology Project
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Ms. Necia Quast
Political Economic Advisor
United States Embassy
Bishkek

Dr. Bryan Roberts
USAID Economic Advisor
Ministry of Economy of the Republic of Kyrgystan
Bishkek

Mr. Paul Dreyer
Regional Director
CAR Regional Office
Environmental Policy and Technology Project
Almaty

Dr. Herbert Fullerton
Senior Economist
Utah State University
Logan, Utah USA

Dr. C. J. Rushin-Bell
Country Representative to Bishkek
United States Agency for International Development
Bishkek

Dr. Trevor Hughes
Senior Economist
Utah State University
Logan, Utah USA

Mr. Alan Schultz
Water Systems Engineer
Tuscon, Arizona USA

Dr. John E. Keith
Senior Economist
Utah State University
Logan, Utah USA

Mr. Tim Van Epp
Information Management Consultant
Environmental Policy and Technology Project
Washington, DC

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Appendix C
Seminar Agenda

AGENDA
Water Pricing in Central Asia
November 15-18, 1995
Dostuk Hotel
Bishkek, Kyrgyz Repulic

WEDNESDAY, NOVEMBER 15

17:00 **Registration**

19:00 **Opening Ceremony**

Introductions: Paul Dreyer, CAR Regional Director, Environmental Policy and Technology Project

Welcoming Remarks:

Honorable U.S. Ambassador Malloy

Honorable Kubanychbek Dzhumaliyev, Deputy Secretary of State Kyrgyz Republic

19:30 **Reception**

THURSDAY, NOVEMBER 16

I. **Introduction and Overview: Water Pricing Strategies and Valuation Methods** (Facilitator: Mr. Alan Schultz)

09:00 Introduction: Objectives of Seminar (Ms. Barbara Britton, EPT/Almaty)
09:15 Water Pricing Overview: Economic Rational for Water Pricing (Dr. Herbert H. Fullerton, USU)
09:45 Water Pricing Strategies (Dr. John Keith, USU)
10:15 Break
10:45 Water Valuation Methods (Dr. Trevor Hughes, USU)
11:30 Cost Allocation and Cost Recovery (Dr. John E. Keith, USU)
12:15 Opportunity Costs as a Basis for Water Pricing (Dr. Bryan Roberts, Economic Advisor, Ministry of Economy Kyrgyz Repulic)

13:00 Lunch

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II. **Republic Presentations: Water Pricing/Current Policies and Issues** (Dr. Herbert Fullerton)

14:00 Water Pricing in Kyrgyz Repulic (Dr. Dyushen Mamatkhnov, Director of the Institute of Water Problems and Energy)
14:30 Water Pricing in Kazakstan (Dr. Muratbek Kasenov, Head of the Department of Economics, Zhambyl School of Entrepreneurship)
15:00 Water Pricing in Turkmenistan (Dr. Omar Niyazov, Deputy Head of Field Hydrogeological Studies; Ministry of Reclamation and Water Management)
15:30 Break
15:45 Water Pricing in Uzbekistan (Dr. Favoris Kayumov, Director; Institute of Market Economics)
16:15 Water Pricing in Tajikistan (Dr.Victor Boltov, Deputy Minister of Economics and Foreign Relations)
16:45 Discussion: Summarize Priority Issues for Water Pricing for Each Republic
19:30 Dinner

FRIDAY, NOVEMBER 17

III A. **Pricing Water for Specific Uses: Potable Use**
(Facilitator: Dr. Herbert H. Fullerton, USU)
09:00 Pricing Water for Potable Use: Case Study of an Existing Water Treatment Plant (Dr. Michael Boyd, Harvard Institute for International Development, Almaty)

III B. **Pricing Water for Specific Uses: Hydroelectric Power Generation**
(Facilitator: Dr. Trevor C. Hughes, USU)
09:45 Policy Options for Pricing Water for Hydroelectric Power Generation (Kuzma Shavva, Institute for Water Problems and Energy, Kyrgyz Repulic)
10:30 Break
11:00 Policy Options for Pricing Water for Hydroelectric Power Generation (Dr. Nurullo Ashurov, First Deputy Minister of Water Management, Tajikistan)

III C. **Pricing Water for Specific Uses: Irrigation** (Facilitator: Dr. John E. Keith)
11:30 Pricing Policies for Irrigation Water (Dr. Zemlyanikov, Head Engineer, Kazakstan Hydrometerological Project, Institute of Water Management)
12:00 Pricing Policies for Irrigation Water (Dr. Larisa Sosnitskaya, Leading Researcher, Institution of Economics of the Academy of Sciences, Turkmenistan)
12:30 Water Management in the process of transition to paid water for Irrigation Use (Dr. Yadgar Sabitov, Head of Economics Division, Ministry of Reclamation and Water Management, Uzbekistan)
13:00 Lunch

III D. **Pricing Water for Specific Uses: Comparative Analysis and Critique of Alternative Water Pricing Schemes** (Potable Use, Hydroelectric Power, Irrigation--Panel format with Mr. Alan Schultz/Dr. Herbert Fullerton as Moderators)

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14:00 Hydroelectric Power (Lead Discussant: Dr. Trevor C. Hughes, USU)
14:30 Irrigation (Lead Discussant: Dr. John E. Keith, USU)
15:00 Other Water Uses (Lead Discussant: Fullerton/Roberts/Boyd)
15:30 Break

IV. Prioritization of Key Price-Related Issues and CAR Information Requirements

16:00 Identify Commonalties and Differences in Pricing Issues by Type of Water Use Among the Republics
16:30 Discussion of Key Price-Related Issues and CAR Information Requirements
19:30 Dinner

SATURDAY, NOVEMBER 18, 1995

V. Action Plan and Resolution

09:00 Reaching Consensus on Water Pricing Issues in Central Asia: Reflections and Recommendations (Dr. Albert Rafikov, Executive Committee of the Interstate Council on the Problems of the Aral Sea Basin)
09:45 Summarize Regional Priorities for Water Pricing in Central Asia: (Facilitator: David McCauley)
10:30 Break
11:00 Determine an Approach for Resolving Water Pricing Issues Among the Central Asian Republics (Facilitator: Barbara Britton)
13:00 Lunch
14:00 Action Plan Development Facilitator: David McCauley
15:30 Seminar Resolution (Facilitator: Barbara Britton)
16:00 Cultural Excursion
20:00 **Farewell Dinner**

Appendix D
Seminar Reports

Topic: **Water Pricing in Irrigation in Kyrgyz Republic**
Speaker: **Dyushen Mamatkhanov**

The Central Asian Republics are situated in the zone of aridity, where sustainable agriculture can not exist without irrigation. The Amu Darya (70 cubic km. per hour) and Syr Darya (35 cubic km. per hour) water resources are completely exhausted. At the present time in Central Asia about 8 millions hectares of land are irrigated, the average irrigational standard is 12-15 thousand cubic meters per hectare and the efficiency of irrigation systems is about 65-70%. The water which flows to the Aral Sea from Amu Darya and Syr Darya (10-15 km^3/yr) is very mineralized (4-5 g/l) and contains a lot of harmful substances, this water is useless both for the population, and for irrigation. The Aral Sea disaster was caused by the violation of the fundamental "law" which mandates balanced social ecology with economic development of the region. The assumption is based on the following facts:

a) The extreme growth of irrigated areas in the region has changed the Aral Sea water balance greatly;

b) The large volume of mineralized and contaminated drainage discharged into the Amu Darya and Syr Darya Rivers;

c) The centralized administrative structure of the CAR continues to support the production of "white gold"(cotton), the most water-intensive agricultural crop, and rice.

The increasing water deficit and worsening water quality has resulted in the degradation of soils and flora, changes in fauna, a decrease in treatment branches, and also a decrease in the efficiency of irrigation agriculture throughout Central Asia. The degradation of the ecological situation has a negative direct or indirect impact on the living conditions of 35 million people. One of the main means of water conservation in irrigation and of reducing the water discharge into rivers is a transition to a system of paid water use which allows for conservation of 10-20% of irrigation water and would lead to a considerable decrease in the river water contamination.

The solution to the Aral Sea crisis depends to a great extent on the successful development of methodologies concerning water pricing. The pricing mechanism as a part of a rational balanced water resource management system both on the state and international levels in transboundary water use should include ecological and social approaches, which should be taken into account in establishing different prices. During the period of transition to market relations and paid water use, it is necessary to work out new methodologies in water pricing for irrigation.

World experience shows, that for a successful transition from subsidized water to complete self-accounting and self-financing, it is necessary to develop the following standard documents:

1. A methodology for determining prices for river water used in irrigation, as a natural resource ("water tax").
2. A methodology for determining the prices for ground water use ("water tax").

3. A methodology for substantiation of state defined tariffs for water delivery services in irrigation.
4. A methodology for substantiation of defined tariffs for fresh ground water and surface water delivery for water supply purposes.
5. A methodology for determining defined tariffs for treatment and transportation of drainage, industrial and agricultural discharged waters into rivers.
6. A methodology for determining the value co-efficient in case of excess water drainage in irrigation.
7. A methodology for substantiation of water tariffs in irrigation delivered to neighboring countries from water reservoirs situated on transboundary rivers and on the territories of independent states.
8. A methodology for determining state tariffs for electric power, worked out at the hydroelectric power stations of the republic.
9. A methodology for substantiation of international prices on hydroelectric power sold to neighboring states.
10. A methodology for determining the economic damage caused by contamination above the limits in transboundary rivers.
11. A methodology for determining the economic damage caused by the irrigation water deficit.
12. A methodology for determining the economic damage caused by swamping and salinity of the irrigated areas.
13. A methodology for calculating the payment for breakdown flow of toxic substances into water constructions.
14. A methodology for determining the total economic damage to the Aral Sea caused by the limited water flow into it and by its excess contamination.
15. A methodology of substantiation of international prices on winter electric power worked out by the hydroelectric power stations situated on the transboundary rivers.
16. An economic assessment of the damage caused by the construction of water reservoirs and of other irrigational and water facilities on the irrigated areas.
17. A methodology for calculating damage caused by floods.
18. A methodology for determining the economic damage caused by water and irrigational soil erosion.
19. A methodology for determining the economic damage caused by highly mineralized irrigation water.
20. A methodology for calculating the social damage to the population of the Aral Sea Region due to the lack of water.

It is also recommended that the scientists of CAR in 2-3 years should work out the most important methodologies, which are necessary for initiating the transition to paid water use and self-financing.

Three of the above mentioned methodologies have been worked out by our research group in Kyrgyz Republic. These include:

1. A methodology for the substantiation of oblast standards in payment for water used in irrigation as a natural resource;
2. A methodology for calculating the regional value co-efficient for excess water drainage for irrigation; and

3. Methodologies for determining the standard payment for fresh and ground water collection.

During the transition period the complete price of the water tariff delivered for irrigation consists of two components:

1. Water cost, water as a natural resource ("water tax"), which goes to the state budget;
2. Costs of irrigation systems management for water delivery services used in irrigation.

It is necessary to assess water as a natural resource. Sometimes it is called a "water tax" (or payment for river water collection rights) because each state spends budget money on studies of water resources, quality assessment, planning and management, financing scientific institutions, environmental committees, hydrological expeditions and sanitary stations.

The calculations used for defining standards of payment for the collection of irrigation water from rivers are the following:

1. Data on the area of irrigated land, the structure of crop rotation, harvests on irrigated land, prices and costs of agricultural production, and the income from each crop.

2. The collection of primary technical-economic data from all state institutions related to water economics: hydromet services, hydrogeological expeditions, committees on environmental protection, republic and oblast sanitary stations, and ministries of irrigation and water management.

We are interested only in data on the staff participating in water management activities.

Since the water co-efficient used in oblasts is practically the same and is equal to about 1, we use this figure for substantiating prices for water as a natural resource. Payments for limited and excess river water use in irrigation go to the state budget for financing governmental organizations involved in water management of the Kyrgyz Republic. With regard to the methodologies on payment for excess water use, it is recommended that excess water use be defined as use of five times the limit. This limit is not well proven because of the size of the real income per hectare of cotton producing oblasts in mountainous regions of the Republic of Kyrgrzstan. This co-efficient has an individual substantiation in each oblast of the republic, which differs in the level of water supply, soil conditions, and the size of real income from irrigated areas. Therefore, the co-efficient for the rise in price for excess river water use in irrigation should be calculated individually for each republic.

The following principles are the most important for excess river water collection for irrigation:

1. Payments for excess water use in irrigation should stimulate water users to keep to the established limits in water use; and

2. The water resources of each republic are rather limited, hence, excess water used by one of the users impacts the limits of others and this leads to economic damage in the form of the reduced harvests of agricultural products.

Two tariffs are considered central to the calculation of standard payment:

a) water payment as a water resource ("water tax")
b) water delivery payment for irrigation

The figures showing how the price rises in case of excess river water use for irrigation is equal for determining fine tariffs in assessing water as a natural resource, and also in determining the payment for excess river water delivery to water consumers.

Topic: Policy Options for Pricing Water for Hydroelectric Power Generation."
Speaker: Nurullo Ashurov, Tajikistan

Water resources and their effective use are an important part of the social-economic development and environmental situation in the Central-Asian Republics. The prosperity of the countries and their future depends on a reliable water supply.

Tajikistan is a mountainous country, on its territory there are about 52 cubic meters of surface water, natural lakes hold about 44 cubic meters of water, 20 cubic meters of which are fresh or potable water, and 500 cubic meters are in glaciers. The natural regime of water flow is irregular and is in sharp contradiction with water use by the state economy, in irrigation and hydroenergetics in particular. To avoid these contradictions, reservoirs with a capacity of 7.5 billion cubic meters of water were constructed.

The quality of the republic's water resources are considered to rate at a 1 or 2 level of purity (pure water). The concentration of contaminated substances in them is not as high as 10 (the level of maximum allowed concentration). The volume of ground resources is about 6.6 cubic kilometers. Water quality causes anxiety. In the last 10 years the water quality in the Syr Darya river and in the Gissar Plain became worse because of irrigation water contamination. On the territory of the republic there are about 4.6 billion cubic meters of runoff, including 4.0 cubic kilometers of collected drainage waters. Runoff cannot be of potable or industrial use because it is highly mineralized, but can be used in fish breeding, 20- 80 % and irrigation, 40-80 %.

From the total volume of water formed in Tajikistan, 14.0 cubic kilometers are used for economic purposes, 2.0 cubic kilometers are ground water and 350 million cubic meters are drainage waters. The main water flow for irrigation is 11.2 cubic kilometers a year. This water is used to irrigate 720 thousand hectares of land annually. Taking a huge water volume and distributing it throughout large territories, about 980 thousand hectares, the water economy directly influences the environment and causes ecological stress. Taking into account that only 32%-38% of water for irrigation is used efficiently, it is not surprising that 36% of the land are inhabited now, rain irrigated area is about 170 thousand hectares, the population there is 1.1 mln. people. Water erosion affects 220 thousand hectares of fertile areas, and from there 7.0 million hectares of soil is blown away, that is 2.5 millimeters of topsoil. It will take nature 200 years to reconstruct 1 millimeter of topsoil. The poor condition of irrigated lands, besides reducing productivity, causes infectious diseases such as tuberculosis, diarrhea, typhoid, and cholera, etc.

The water system greatly influences the ecological wealth of the population of the republic. The population of rural areas now is 3.6 million people, or 65% of the total population. Only about 13-15% of them are provided with water (190 thousand people). In cities, the situation is better. Almost everywhere there is a centralized water supply, but water quality is not high, due to poor water treatment.

The main water consumer is irrigation, making up 92-93% of water use. Thus, the most important sector of the water economy is irrigation. The careless attitude toward irrigation water is due to the fact that water was always free of charge and there was no privately

owned land. The transition of land into private property or long-term leasing will motivate individuals and industry to conserve water and other natural resources. This will result in increased fertility and finally an increase in productivity. A change in one's attitude toward one's property should cause economical water use. To further encourage efficient use, the republic will introduce a system in which charges will be levied for water consumption and delivery to consumers.

The proposed system of water payment is established by the Tajikistani "Law on Water Protection," and other natural resources. The introduction of water charges and the transition to a market relationship in the entire water economy, hydroenergetics included, should lead to self-accounting in water resource use and will release the budget from the burden of water management and reclamation expenses.

An edict was signed by the president this year that states that by the beginning of the next year water use should be based on self-accounting and self-financing. To accomplish this, the package of necessary laws must be prepared. The approximate calculations show that the cost of charged water use in irrigation would be 31-32 billion Tajik rubles or 3.26 Tajik rubles per cubic meter of water. In agricultural water use, one cubic meter of water will cost the consumer 2.70 Tajik rubles. Potable water - 2.16 rubles, and pasture areas - 6.27 Tajik rubles. Because of the increased prices for hydroenergy, the cost of water will increase ten fold. We are absolutely sure that the creation of private property or long-term leasing and the transition from the water economy to market relationships will motivate water users to economize and use water carefully.

Topic: **Pricing Policy for Irrigation Water in Kazakstan**
Speaker: **Anatolyi Baranov, Irrigation Engineer**
Institute "Kazgiprovodhoz"

Most water used in Kazakstan is used for irrigation. This includes regular irrigation on an area of 2.2 million hectares, and rain fed irrigation on an area of about 1.0 mln. hectares and irrigated hayfields more than 0.65 mln. hectares. Regulated irrigation uses about 80% of the total volume of water, the rain fed irrigation and irrigated hayfields 15%. Regular irrigation is provided by the surface water for 93 %, ground 4%, drainage and waste waters for 3%.

During the period of transition to a market economy, water use appeared to be without an efficient economic mechanism to regulate water relations, to provide water economy entities with the opportunity to work on the principles of cost accounting and self-financing, and at the same time to get rid of the artificial deformations both in economic relations and in the State economy as a whole. Such a mechanism is charged water use, which have been proven by the experience of other countries to be an efficient means of water management. Furthermore, it contributes to the increase in economic efficiency of agricultural production on irrigated areas, the productivity of land and water.

Water prices consist of two items: costs, the cost of water as a natural resource and the cost of treatment, delivery and transportation from the water source to consumers. In Kazakstan water economy entities and enterprises have a mixed type of financing which includes support form the federal budget, and on the basis of cost accounting management.

Since January 1, 1992 in accordance with the resolution of the Cabinet of Ministers of Kazakstan 4.03.92 # 182 " On the Payments for Water Services in Irrigation " all the irrigational water consumers must pay for water. Payments are made on the basis of tariffs adopted by the district administrators in accordance with the resolution KM RK from 03.01.92 # 3 " On the Measures on Liberalization of Prices. "

The calculation of costs for water delivery with regard to the costs of water economy entities is made on the basis of a single tariff (per cubic meter), in accordance with the methodological recommendations "Complete cost accounting in water economy organizations " VNIIG and M, M-1991. Service tariffs, besides recovery of exploitation costs, include costs of production by charging 10% of costs from the adopted tariff per cubic meter from water users.

The tariffs include assignment for State Social insurance (until the Law on Taxes is adopted)- 38%, medical -1%, fund of employment - 2%, from salary fund, fund of economy reorganization - 5% from services, in accordance with the President's edict "On the Republican Budget for 1994 " from January 94 and taxes for added costs 20 %. Tariffs for water services per cubic meter in 1994 fluctuated from 1.4 to 35 tyin, in the Aral Sea basin - 3.5-4.7 tyin.

Until January 1, 1995 water entities serviced water delivery to irrigation areas for 561 m tenge, but only 105 m tenge or 19% of this sum was on their accounts. Water users appeared to be insolvent, and the entities incurred losses. Financing of measures on maintenance and repair of water economy entities, unrelated to services, made from the budget by the

Committee on Water Resources was 74.8 m tenge, the plan was 138.4 m tenge or 54%. As a result, many irrigation systems are being exploited inefficiently, the main funds are gradually wearing out, increases the water loss, decreases the productivity of agriculture.

At present time, charges in water use in the republic are only in the process of being introduced. The water tax law and water tariffs are now being worked on, the charges for water delivery to the irrigational areas are being introduced, the tariffs for use of water from the water economy systems (surface and ground waters) for industrial purposes. Thus, the system of water payments is not worked out yet and people do not use water with care.

The water price should be determined by cost recovery, costs for water delivery, funds recovery, of entities, costs for measures on water saving and transportation, costs for water distribution through KDSV, insurance fund, normative incomes and other costs, which are necessary for normal functioning of water economy entities and to provide normal water management and water use.

The water pricing issues where water is treated as a natural resource were studied last year in Kazakstan as the part of works on the Water Taxes Law of Kazakstan. But soon the studying were stopped because of finance problems. The original water price should be the price of water protection and water conservation , reproduction of water resources and include all the costs on all types of economies , water distribution and water treatment, used for better water management, regulation of water regime, rational use of water resources , protection of water from contamination, conservation of water objects, organization of necessary water delivery for the State Economy which meets the demands of production activities of all branches - water users .

The evaluation of water price should be based on economic calculations, that predetermines the increase of the efficiency of water use in different branches of economy. The introduction of prices will cause the reevaluation of the costs of final products if to consider water as a natural resource.

The introduction of charges on water should directly impact on rational and economical water use and through this improve the ecological situation .There is a social-political aspect in this problem, that is the attitude of the population to the economic ways of solving the problem. In primary out-works water cost was calculated in percentages from the cost of gross out put. This was explained by unsustainable economic situation and inflation. The basic prices were calculated with taking into account different levels of water supply in different branches of economy and Co-efficient of economic production. That was for agriculture, municipal and fish-breeding 0.05. For industrial enterprises - 0.15. The sum of cost recovery was : from municipal economies 3%, industrial enterprises 43%, agriculture 47%, fish-breeding 1%, hydroenergetics - 5%, water transport 1%.

The economically driven mechanism of water pricing had never been studied in Kazakstan on the International level. Kazakstan has boundary rivers with Russia, China, Central Asian Republics. The most acute problems are in the Aral Sea basin, which is evidently becoming a dead lake , and the whole region is an area of ecological disaster. Aral sea is a nature complex and must be treated as a water consumer with a right on water to improve the environmental conditions. We think, that the right policy in tariffs for

irrigational water use is the main factor in water management and will influence the development of agriculture and should include the following :

- system of benefits to water users in definite conditions
- the Governmental participation in financing ,subsidies, credits, etc.
- normative regulations, fines for water contamination

Topic: **Water pricing in Tajikistan**
Speaker: **Victor Boltov,**
Deputy Minister, Ministry of Economics and Foreign Economic Relations of Tajikistan

Dear guests,

I would like toexpress my gratitude for the invitation and the opportunity to make a presentation at this seminar. Tajikistan occupies a mountainous part of the Aral Sea Basin territory that is 143.1 thousand square kilometers, 93 % of which are mountains. The water supply in Tajikistan is the largest among the Central Asian Republics. The average annual water flow is 53 cubic kilometers, Amu Darya basin 51.4 cubic km, and the Syr Darya 1.3 cubic km. The main water flow is from rivers Pyandj which holds 24.1 cubic km; Vahsh with 16.2. cubic km; Kofarnihon, 5 cubic km; and Zarafshan, 5.1 cubic km. The total supply of water resources in lakes in Tajikistan is 46.3 cubic km, fresh water lakes make up 20 cubic km. There are supplies not only of surface water, but also a considerable supply of fresh and mineral ground water. The supply of fresh water for potable, economic, industrial and agricultural purposes is estimated to be 1.8 cubic meters. Considerable water reserves are retained in glaciers which hold about 500 cubic km of water.

The main water consumer in Tajikistan (90 %) is irrigation. The area of irrigated land comprises more than 700 thousand hectares and cultivated lands 550 thousand hectares. In 1994, 5.63 cubic km of water from the Amu Darya and 2.20 cubic km from the Syr Darya were used for irrigation and other needs. Waste water amounted to 7.83 cubic km. As a result, in the Amu Darya Basin, only 45.8 cubic km of water flow out of the republic. However, this water does not flow to the Aral Sea because it is used in unlimited, unregulated and irrational quantities.

The territories of the Amu Darya and Syr Darya water basins have more than 20 million hectares of irrigated lands, at the same time the irrigated area is 4.25 million hectares which means that only 1 of 5 liters of water is used efficiently. The remainder is waste which salinates the land, produces fowl orders in the sand and therefore, contributes to the Aral Sea problem. Water use from rivers of the Aral Sea Basin exceed the projected norms by 15-50 %. Average data for Central Asian Republics irrigation water use exceeds norms by 34 %. The main reason for such careless water use in the Central Asian Republics is the absence of mutually developed and agreed upon mechanisms for water use and water distribution.

One of the principal ways of solving the problem of economical and rational use of water resources, in my opinion, could be the introduction of cost accounting. Under the present conditions of market relations in CAR, the problems of water pricing have not yet been adequately studied. Each republic is solving this problem differently than the others. The introduction of water charges will save a great amount of water and save the land from salinity and soil erosion.

In 1990-1991 an experiment began in Tajikistan when charges for excess water use were introduced. Contracts on water use were signed with water management and the first results were very good. More than 10 million rubles were paid to the federal budget for excess water use, the cotton was good, the soil salinity decreased, as did soil erosion. A feeling of responsibility for economical water use and electric power use arose. Unfortunately, the

Civil War completely destroyed the first good results. At present time the situation in the republic has stablized, the economies that were destroyed are being reconstructed and in 1995 the payment for above the limit water use was reintroduced. It is probably difficult to comment on the results now, but nevertheless there have been some positive results already.

During the present period of transition to market economics, we are working a lot on the introduction of water charges. We have worked out a methodology and prices for water delivery, legal documentation has been prepared, and a program on gradual transition to charged water use has been initiated. The first stage of the program includes water use charges in machine irrigation, work in other spheres will follow later. There are some difficulties implementiong this system and we think that the same difficulties exist in other Central Asian Republics.

For example, the definition of price in monetary terms can be determined in two ways. In a planned economy based on the labor theory, more commonly known as the cost theory, price is based on providing the service for all accounted costs. Of course, the service or product must be in demand.

In a market economy the price is flexible and determined by the law of supply and demand. In this case the marginal costs are the most important.

First of all, it is necessary to determine what constitutes a service. The water supply is not a service at all. Only regulated water supply is a service, though not complete, because we are interested only in Tajikistan's water supply. That is why for neighboring republics only changes in the water supply can be considered a service. In some respects, water quality can be a service (its improvement relative to some kind of standard).

It is necessary to comment on the drawbacks of these two approaches. In the first case, if we charge for excess water use between the republics, then we are developing a plan. At the same time we know that existing plans and principles of water sharing discriminate against Tajikistan. Besides, any plan can be developed on the basis of a long-term forecast. There are no opportunities for such a forecast in Central Asia now. In this case, failure to adhere to the plan caused by natural hydrologic conditions can make other republics feel they have cause for compensation.

The same situation exists when water quality is a service: here we need to have mutually agreed upon standards, and we don nott have them yet. If there is a system of standards in water management, then the system of fines can be introduced for water contamination, etc. The second problem with the methodology is the problem of a definite price. When we use a cost methodology, a scientifically-proven structure of costs needed. We can not include the costs of water facilities and labor in these costs. Part of the costs belong to some other branch of the economy - energy, fish breeding, transportatiion, etc. The other part is of a national interest. To separate and agree on these issues is rather difficult. Besides, it is important to establish which costs are more important: existing or former.

However, this is not the most important issue. This cost methodology might have a boomerang effect. For example, when we demand compensation from Uzbekistan for the exploitation of water constructions on theVahsh River, we are to be ready to meet the same demands from Kyrgyztan for the SyrDarya River. We are ready to cooperate with the scientists of neighboring

countries to work out methodologies for the economic evaluation of water as a natural resource used for irrigation by compiling the following:

1. A methodology for determining the cost of contaminated water flow;
2. A methodology for determining the standard- payments for water as a natural resource from fresh ground water sources.

We counted about 20 methodologies that we need to work out to introduce charged water use in our republic, but we are sure that it is impossible to do this without cooperation with the scientists from other republics.

For this we need to appoint a lead organization or institution. We would like to suggest The Kyrgyz Institute of Water Problems and Hydropower, and Dr. Mamatkhanov personally to be the leading institution and to create a special working group on a regular basis to organize these activities. I think we need to do this as soon as possible, otherwise we are going to have conflicts and the number of them will increase, because there will be a low water seasons in Central Asia in the next two to three years.

There is one more issue I would like to mention, the introduction of charged water use will provide us with the opportunity not only to use water economically in the Central Asian Region, but also to create new technologies for water conservation. Everybody knows that natural resources have the tendency to lessen in periods of exploitation. In connection with this we must join our efforts to increase the number of power generating resources, to construct more hydroelectric power generating stations in Central Asia and thus to create a unique energy power ring in Central Asia. I did not comment on problems that have already been discussed especially with relation to Kyrgyz Republic. We have common problems in Central Asia and we will solve them only through mutual cooperation. Dear guests, thank you again for the opportunity to give a presentation. I think this seminar will give a new impulse to preserving water resources in the Aral Sea Basin.

Topic: The Approaching Pastureland Disaster is More Horrible than the Aral Disaster
Speaker: Kasenov, M.R.
Kazakstan

Dear Ladies and Gentlemen,

First I would like to express my gratitude to USAID and Institute of Water Problems of the Republic of Kazakstan, sponsors of the seminar, for the opportunity to express ideas on water management problems in the Central Asian Region. For Kazakstan, one of the most important problems in this respect, besides the Aral Sea, is the problem of pasture irrigation and agricultural irrigation.

For this seminar, I was supposed to prepare a report on the topic: "Current policy of water pricing and factors preventing the development of water pricing policy in Kazakstan." This report is ready, but yesterday after listening to the speeches made by Paul Dreyer, Mrs. Malloy and the officials of the Republic of Kyrgrzstan at the opening ceremony, I have changed my report. Now I want to discuss another topic: "The approaching pastureland disaster is more horrible than the Aral disaster," which I guess coincides with the theme of this seminar.

It is difficult to overestimate the importance of pastures in solving water use issues. If it were possible to use nutritious components of forage, then the problem of food especially in the sphere of cattle-breeding should have had a very prompt and positive solution. The English farmer, R. Hamilton thinks, for example, that if all pastures in the world had been entirely used, people would have had plenty of food at a very low price and, in particular, products of cattle breeding which are in a great demand nowadays. It should be added that besides all these products pastureland cattle-breeding provides people with wool and leather for clothes and shoes.

Traditionally on the vast territories of the Republic of Kazakstan, cattle-breeding was the most important industry for the republic. Kazak people are very experienced in cattle-breeding, the ideal use of pastures depending on the season of the year, and in finding water resources. Nevertheless, this experience is not used in the society and actually is not assessed properly, and pastures of Kazakstan, being the treasure of the republic has been forgotten.

Think this over. The total area of pastures in Kazakstan is 182 million hectares. Kazakstan takes the second place in the world the sizes of pastures, a bit behind Australia (198.2 million hectare) and considerably exceeds such cattle breeding countries such as Argentina and Brazil. The natural potential of all these countries is approximately the same. But in Australia the number of sheep is 170 million and 3 million big cattle.

In Kazakstan at the beginning of 1989, there were 38.5 million sheep, 9.8 million big cattle, and 1.6 million horses. This the maximum number of cattle in the Soviet period. At present, the process of decreasing the number of cattle and reducing agricultural production is irreversible. Only in 1994 the quantity of sheep in comparison with 1993 had decreased by 124 thousand heads. If the quantity of cattle continues to reduce like this in future we are going to have a horrible disaster, which would be caused not only by inefficient use of pastures, but also by the supply of agricultural people with good water.

It is known that the ecology of pastures is the ecology of a man. That is why the coming catastrophe undermines the life of the whole region, mainly of the locals, their main occupation is cattle-breeding. People reside where their ancestors lived for many years. This tragedy is going to be worse than the Aral disaster. Now it is not enough to discuss this problem, but we should unite all our efforts: scientific, financial, organizational and foreign investments to solve social-economic problems related to cattle breeding.

The use of pastures usually is defined by water use. Forage and water are the main things needed in the rearing of cattle. Forage does not seem to be a problem on pastures lands, but water needs to be found first, delivered and supplied, and for this any small source of water can be used.

Now in Kazakstan there are 8 thousand pit wells and 32 cased wells, and 70% of pastures are watered from them. They are not called water structures in the full meaning of this word. At the same time there is a problem of water quality in rural areas, where irrigation takes place. More than the half of rural populations consume drinking water that does not meet sanitary standards.

Therefore watering is the most important factor in the use of pastures. The last account and report on watering of pastures in our sovereign state is dated by 1990. At that time, there were more than 100 thousand water resources located on pastures and about 90 thousand engineering water constructions. The actual water consumption for one person is 30-35 liters in day, five times less than the standards stated by the UNO for each rural person in the world.

Several cases of epidemic diseases caused by potable water of a bad quality occured in Kurdai region of Zhambyl Oblast. The main reasons for this is the complete contamination of water resources both surface and underground, the absence of water treatment constructions, the lack of water disinfection and also the lack of economic stimulating good potable water supply.

Presently in Kazakstan there are several water pipe lines of great length such as: Bulayev, Ishimskyi etc. The total length is 15 thousand kilometers. There are no other water pipe lines this long in the world. However, during the period of market relations, conditions of exploitation of group and local water pipe lines is coming to its critical point. As a result, the volumes of water delivered to consumers have decreased greatly. One of the reasons for the reduction of potable water consumption is the quantity of accidents on the pipelines, because they are being used without repair for more than twenty years.

An effort to organize the republican fund of investments on the basis of tariffs for one cubic meter of water for the partial recovery of necessary volumes of reconstruction is stopped by the insolvency of the consumers. In this respect, it is necessary to carry out the complex of scientific research, organizational and economic measurements. I would like to believe that in the resolution of this seminar, the project for watering pastures will be solved and foreign investors will invest money in it.

Topic: **Production costs and problems of water pricing in irrigation.**

Speaker: **Favoris Kayumov**
Head of Department, Institute of Market Reforms
Uzbek Academy of Agricultural Sciences, Tashkent

I. Irrigation in the agricultural system and the need to refine the economic mechanism for irrigation water management

The agriculture of Uzbekistan is completely based on irrigation. Only 3-4% of agricultural products grow in the huge desert, half-desert pastures, and mountainous areas. The area of irrigated ploughed fields is 4.5 million hectares. Uzbekistan contains the most ancient and the largest irrigated zone in Central Asia which has favorable natural and economic conditions to enlarge food production for the increasing population and for export. The good temperature, long vegetation period, and experience in irrigation, provide an opportunity to gather crops twice or even three times a year. Irrigation provides sustainable productivity, guarantees good crop quantities and highly efficient capital investments in agriculture.

Calculations have shown that in the last 20 years (1970-1990) recoupment of capital investments in Uzbekistan, Tajikistan and Turkmenistan was higher than in the former Soviet Union by more than three times. It should be noted as a historical fact that in the former Soviet Union, the development of the water economy and the growth of investments were always a priority. From 1970-1990 irrigated areas in Central Asia increased 1.7 times and exceeded 6 m hectares.

However, irrigation water resources were not used and are currently not being used very efficiently. For cotton irrigation, depending on the district, the irrigation norm in Uzbekistan is 5-8 thousand cubic meters of water. In fact, 12-16 thousand cubic meters of water are used. Efficiency of irrigation systems is 58-65%. Irration water use leads to the development of saline soils, swamps, decreased harvests, and the disappearance of irrigated lands for agricultural use. Irrigation techniques are improving slowly, hyowever, furrow watering in cotton irrigation still exists.

The main reasons for inefficient water use in irrigation are the lack of high technology used in the irrigation network, poor development of anti-filtration measures, and automated and mechanical machines for irrigation water distribution. The second reason is the absence of an economically driven mechanism stimulating the adoption of the practical measures directed at rational water use. The failure to charge for water direcly over a long period of time was a serious pshcycological and organizational obstacle to realizing measures for water conservation technologies.

The original reason for free water use in cotton production as in all branches of the economy is rooted in the administrative system of management and the absence of a market economy on a national level. In the last ten years, the understanding of inefficient uncharged use of natural resources, irrigation water in particular because for its considerable transportation costs, changed and it was decided that practical measures should be taken to introduce a system of paid water use. In 1990 the Cabinet of Ministers adopted the resolution "Regarding the Introduction of Charges for Irrigation Water Use." An additional tax was authorized on

agricultural product purchases to compensate for irrigation service costs. In Uzbekistan and in some other republics, an experiment on water charge use was carried out. In Uzbekistan the experiment was held in 1989-1990 in 13 districts, or in each oblast of the republic. In the economies which participated in the experiment, state subsidizing was stopped. The water economies were put on a self-supporting and a self-repayment basis. The single source of financing was the income from the sale of water.

The water price was supposed to compensate for the cost of water management services and to provide a profit of 8%. This experiment was useful and exposed the financial drawbacks and difficulties. The costs were based on the maintenance and operation of hydrotechnical operations for irrigation and land-reclamation purposes. Sums for large unique water management complexes were excluded from the calculations of the total costs.

It should be stressed that the water pricing issues were put on the agenda a long time ago and not only once. In 1927-1936 a water tax was introduced. Later it was abolished and a special charge for water use for rice producing economies was introduced. The payment was not based on the volume of water consumption, but on the amount of irrigated areas. In the 1960's the elements of a self-supporting management and water payment system was introduced on the Large Chu Canal in Kyrgyz Republic.

However, the multiple experiments did not become real practice. Then, times were different. There was an administrative system of management which dominated the entire economy. Now that the first stage of economic reform has ended, the process of reconstruction of state forms of production into private forms of management is taking place. There is a necessity and opportunity to introduce market relationships into the water economy and to introduce paid water use.

In irrigated areas, the land and water function together. Their common effect is expressed in agricultural products. That is why water payment can be partially introduced through the land taxation system. In Uzbekistan in 1995, a tax on land was introduced. Its size was differentiated according to the size of agricultural territories and quality of irrigated lands. The average tax was 200-250 rubles for 1 hectare of irrigated area. Seventy percent of this money is used by the local authorities to improve the irrigated areas and to conduct land-reclamation activities. But the tax on irrigated lands can not substitute for water payment. The tax and payment should be put together for each of these forms of payment to have a stimulating function.

2. Specific characteristics of agriculture that should be taken into account when modeling water prices.

In confirming water payments for agricultural use, it is necessary to take into account the specific character of irrigation water consumption in agriculture. First, agricultural production from the technical point of view is a comparatively out-dated branch of the economy. The share of hand work is still rather high, work productivity is low. This influences the costs which are consequently high, thus the ability of agriculture to compete with other sectors is very low.

Second, agriculture deals with live plant and animal organisms with their own specific characters and development, a long vegetation period which is in most cases is equal to a year. These factors predetermine a very slow turnover of capital and low annual incomes in

agriculture. Third, in agriculture there is a big difference between a production period and a working period. This discrepancy causes a relatively low return. Fourth, in agriculture the speed of growth and the speed of development are different from those in industry. That is why when approving irrigation costs, it is necessary to create priority conditions for agriculture in order to provide good incomes and profitability, which are necessary to a broaden reproduction and increase wealth.

3. The methodology for defining irrigation water costs and prices. The primary model for defining costs of water economy entities.

Any price, irrigation water included, takes into account the costs of production. At the same time, price regulates the demand and supply of services. Irrigation water is a specific product (service) by its nature and scarity. Besides direct costs on its "production," transportation and consumption, society spends additional means and labor, which should be compensated with profits. That is why it makes sense to represent water costs from the point of view of its purpose - to provide agriculture with irrigation water.

Reviewing the structure of the exploitational water management entities formed in the republic, three stages of production and transportation could be identified:

1. BVOs Syr Darya and Amu Darya, the basin water economy authorities formulate water resource management plans in the basin and distribute resources between consumers through republican and local water economy entities, the sphere of their activities spreads through several oblasts. This is why the costs should be shared between them based on proportional water volumes. Among the costs to the oblast are the costs of running "Oblremvod," and other departments exploiting water facilities within the oblast.

2. If the final step in this chain is at the district level, the last service delivery costs are incurred at this level, then the last step on this stage is the RPRO regional repair and exploitation union.

3. Cost formation within structural departments of exploitation water management organization.

Full costs in the water management economy are summed up by the following types of costs:

- exploitation costs of the water management facilities of international importance
- exploitation costs of the water facilities of interoblast importance
- exploitation costs of water facilities of oblast importance (or interdistrict importance)
- exploitation costs of water facilities of district importance

In the last two, in addition to water delivery costs the costs of land-reclamation services are also included.

As a whole, the cost of the water management economy can be presented in the following way:

$$C_{sum} = C_{id} + C_{ir} + C_{i}$$

where: C_{sum} - is a sum of complete costs of exploitation water constructions

C_{id} - are exploitation costs of international water constructions

C_{ir} - exploitation costs of republic (interoblast) water constructions

C_{i} - exploitation costs of oblast water constructions

The exploitational costs are made by summing up annual costs, which include salaries, insurance costs (37% to the actual salary fund and 2% to the employment fund), treatment costs, electric power costs, depreciation of capital funds, capital and current repair, transportation and other expenses.

Each type of exploitation cost of the construction of international, republic, oblast and district importance has the same components as mentioned before. Theoretically, the calculated indicators of exploitational costs should be the normative costs. However, the real situation in this branch of the economy is extreme use and repair. That is why in the future the real volumes of costs should be calculated. Then, water delivery costs are distributed between water consumers in accordance with their share of water consumption.

In accordance with the functional connections and structures of services between the water economy entities the service costs will be calculated. It is necessary then to take into account the level and the importance of these water facilities in their exploitation functions for water management in river basins in CAR and in Uzbekistan in particular. For example the Syr Darya and Amu Darya BVOs are international entities, hence, their costs should be distributed in proportion to shares of exploitational water facilities.

In the future, the determination of oblast facility services and later district exploitational water facility costs could be transferred to appropriate shares of costs and combined prices. A similar system of cost allocation is used by Minvodkhoz. Thus, at the present stage of economic reforms, costs should be taken as a basis for water prices. But the price should be correlated in accordance with the scarceness of irrigation water, the value of produced goods and its profitability.

In the course of market relationship development, the water price will correspond more closely to principles of free pricing market, proved by the relationship between supply and demand.

Topic: **Water pricing in Turkmenistan**
Speaker: **Omar Niyazov, Turkmenistan**

On March 1, 1994 charged water use was introduced by the President of Turkmenistan, Resolution #1800 dated May 5, 1994. The resolution was on irrigational water use for specific groups of consumers and excess water use in order to increase the responsibility of water consumers to use of water resources more efficiently. The idea being to partly recover the costs of the state water management.

Water use is charged to all types of consumers based on the actual volume of water per cubic meter consumed in places where water is delivered by the federal government on the basis of a single tariff for the whole republic :

1. Industrial enterprises and other water users, whose activities are not related to irrigation, are charged for the entire volume of water used.
2. Agricultural entities are charged for excess water use in irrigation.

The projected water use and limits are determined in the established order by the Ministry of Reclamation and Water Management of Turkmenistan on the basis of the documents of water users. The payment for water use is taken from consumers on a contract basis. Contracts are signed by the water resources management organizations of Minvodhoz - The Department of the Karakum Canal, Etrap departments of irrigation systems and other organizations that supply water to water users. The contract is signed for one year and is prepared before the beginning of the following year.

Modification and termination of the contract are possible only in cases stipulated by the law and are drawn up in an additional contract. Any arguments over the contract after its signing are decided in a legal manner. Monitoring the amount of water discharged at places of water distribution is made under the mutual observation by the authorised representatives of the provider (exploitational entity) and consumer no less than two times a day, at a specified time. If one of the parties is not present at the time of monitoring, the absent party can not argue about the data collected by the others.

Water delivery and water distribution are registered in special notebooks, one for each party. The water delivery to consumers for irrigation during low water seasons decreases in proportion with the projected needs, providing equal water supply for all of the consumers.

On the basis of a hydrological forecasts, exploitational water management entities inform water users about low water seasons before the first delivery of irrigation water. The exploitational water management organizations, under conditions of charged water use, create an insurance fund for additional water supply in low water seasons to eliminate the consequences of natural calamities. This fund is located in the Minvodhoz of Turkmenistan in order that it function efficiently.

Tariff calculations and allocation of means coming from water sales:

In accordance with the President of Turkmenistan's Resolution # 1800 of May 1994, the charge for industrial and other water consumers not involved in irrigation, and excess water

use at the irrigated areas is based of a single tariff per cubic meter of water delivered in Turkmenistan. The one rate cubic meter tariff was determined based on the relationship between total operating costs for Minvodhoz for water delivery for irrigational purposes, by other needs in conditions of charged water use, and by the volume of projected water delivery from all sources. This tariff wass adopted by the Minvodhoz of Turkmenistan in agreement with the Ministry of Economy and Finance of Turkmenistan. The costs of the exploitational entities of Minvodhoz, which are not involved directly in water delivery, are included in the calculation of tariffs.

The following factors are included in calculation of a tariff for projected exploitational costs:

1. Direct operating costs of Minvodhoz's federal divisions (not including P/O "Turkmenselhozvodosnabzheniye" and BVO "AmuDarya");
2. Normal profit is not less than 25% of direct exploitational costs;
3. Financial means for creation of an insurance fund, from 10% of direct exploitational costs; and
4. Amortization assignments for a complete reconstruction of basic production funds, which is 2% of its average cost.

When the specific operating costs of federal water entities fluctuate more than 5%, water delivery tariffs are corrected and readopted by Minvodhoz in the existing order. Taking into account the fact that the introduction of charged water use is partial, the following order of allocation of means has been established:

In order to use the income from a system of paid water use in Turkmenistan more efficiently, the primary exploitational entities are allocating and spending money in the following order:

1. Centralized Minvodhoz fund - 25%,
2. Velayat PO - repair shops - 25%
3. Primary entities - 50%

On all levels of management, 50% of the means are used for exploitational measures, operation and maintenance, directed at the improvement of water monitoring and the technical condition of exploitational constructions; 25% are used for the purpose of technical progress and development of regulating documents, the remaining 25% on financial support of the collaborators.

Payments for charged water use:

The economic relationship between water users and federal water entities in a system of paid water use is agreed upon in contracts that reflect the main conditions, responsibilities, scopes of work, tariffs and water delivery costs, as well as fines and other sanctions applicable to both parties if the conditions of the contract are not met. The payment for delivered water is made during a period of 10 days on the basis of a letter approving the supply and receipt of water.

Industrial enterprises and consumers not involved in irrigation consent to pay three times the regular price for excess water use based on the daily log of water monitoring.

1. In case of illegal water use, the users pay a tariff 10 times the regular price.
2. The water 'user' pays 0.03% of the over due amount each day of over due payment.
3. In case water is not delivered in accordance with the plan then the "supplier" pays the "consumer," a tariff two times the regular price.
4. Disagreements on paid water use are solved by their head organizations and if consensus is not reached, the economic courts.

Actual Implementation of Water Pricing:

Industrial use:

Judging from the contracts signed, the annual water flow is 109.2 million cubic meters, the total cost 55.1 million manat, UKG 103.36 million cubic meters are included, consequently the total cost is 52.9 million manat, P/O "Murganremvodhoz" 5.4 million cubic meters - 2.7 million manat, P/O " Ahalremvodhoz"-0.44 million cubic meters on 0.27 million manat. During 9 months 76.0 million cubic meters were delivered. During this period 9.76 million manats were received, of this Minvodhoz received 7.12 million manat. The debt is 28.3 million manat. Incasso - 9.1 million manat.

Irrigation:

The total limit on water delivery for irrigation for 9 months is 14,479.3 million cubic meters. In fact, 15,475.6 million cubic meter or 996.4 million cubic meters in excess of the total limit were used at a total cost 593.4 million manat. The excess water use was equal to 593.4 million manat.

Agriculture:

The water users signed contracts 791.7 million cubic meters of excess water use for 514.4 million manat. Of this sum 268.6 million manat were paid. The agricultural users did not pay for excess water use.

Calculations:

1. Optimal required operating costs of Minvodhoz in 1995 = 6,204.2 million manat
2. Average cost of capital funds in 1995 = 3,444.4 million manat
3. The projected profit under conditions of charged water use (25% from direct costs) = 1551.1 million manat
4. The insurance fund (10% from direct costs) = 620.4 million manat
5. Amortizational costs for a complete reconstruction of capital costs (2% from average cost) = 68.88 million manat
6. The total cost included in the tariff: 6,204.2 +1,551.1 + 620.4 + 68.88 = 8,444.58 million manat
7. The projected water delivery in Turkmenistan in 1995 = 16,780 million cubic meters

8. The average tariff per cubic meter of water delivery in Turkmenistan is 8,444.58 million manat: 16.780 million cubic meters = 50.3 tenge

If the exploitational costs change more than 5%, the tariff should be recalculated and readopted. The actual financing of the operational expences of Minvodkhoz of Turkmenistan in 1995 is determined on the basis of the minimal need and is 3.603 million manat.

Topic: Economic Mechanism and Priorities In Water Pricing.
Speaker: Albert Rafikov

At the present time there is a situation of water deficit in the Aral Sea Basin. Water supply and water distribution determine the development of the economies in the independent republics of the region. Economic activities, industrial enterprises, agriculture and other entities, and the living conditions of the population depend on the quantity and quality of water sources and on water flow regimes. It has become necessary to reconsider the relationship between water management systems and water consumers, under current conditions where their relationship is being financed by the economy.

Experience shows that in a period of transition to a market economy, natural resources are mainly used in the production of consumer goods and services that society needs. This provides for the opportunity to economically stimulate the activities of enterprises under conditions of limited resources. In conditions of water deficit, the water economy, as it relates to natural resource use, the construction of distribution systems, and water supply to irrigated land, must to be a paid service. Under the new conditions, this becomes possible with reasonable cooperation between federal management and entrepreneurial activities. The first is related to natural resource use and the control of water resources in their natural state. Entrepreneurial functions should be allowed in economic structures that have economic relationships with water consumers who use their products and services, for example agricultural and industrial enterprises or municipal services.

A paradox arises in the water economy because water consumers work on the principle of cost accounting, but water management entities are financed from the budget, although they are at the head of goods production, both industrial and agricultural.

However, the development of market relations shows that the market economy is not all-powerful and blameless. It does not solve problems of social equality, it is conservative and it is not sensitive to long-term governmental programs. Here, the role of a plan cannot be under-estimated because the government, with the help of budget subsidies and state orders, establishes priorities and attempts to solve the problem that the market cannot solve.

In activities of strategic importance it is necessary to follow a plan. The plan would include 1) controlling water formation and water use from natural sources by establishing priorities in setting a price for water; 2) forecasting water flow and the problems of water resources replenishment; 3) perspectives in water economy development and elaborating programs of increasing the water use in order to provide the population with jobs and to solve food problems, 4) developing scientific research projects and introducing new technologies in water management, and 5) the development and management of the water economy.

The relationship between the plan and the market should be such that the plan does not work against the market, but assists functioning of the market to increase the efficiency of the state's economy. Both systems, state and entrepreneurial should complement each other using different methods of setting limits, fines, taxes and benefits.

At the present time, there is a single centralized system of water management which extends from the ministry to the district unions. The sytem dictates the planning of activities, supply and distribution, procurement resources, equipment and techniques for all divisions

from top to bottom. As a result, the activities of water entities are limited by the number of instructions and regulations. On the level of providing services to agricultural enterprises and other water consumers, there is an agreed upon relationship between the water management entities and water users that is not based on horizontal economic relations. As a result, there is a lack of interest by water management organizations and entities in the success of economic activities.

As a matter of fact, the economic relations, and economic relationships should take into account everyone's interests, influences upon these interests, and the management of these interests.

The interests of economic entities is a stimulating motive in the activities of enterprises. The production aspect of the development of intereconomy relations is the demand to introduce progressive technologies and equipment and improve the basis for a division of labor. The organizational aspect of close inter-economy relations is the increase of the degree of independence of enterprises.

Individual, collective and public interests will drive the future development of (economic) relationships and the functioning of the water economy and agriculture. It is necessary to manage economic processes through perfecting and changing relationships between production, distribution and organization, so that they impact the motives of people and their material, economic, social and moral interests.

These conditions are proven by processes that are taking place in agriculture. Significant reformation of agricultural enterprises is taking place. Instead of collective state farms, small family enterprises are appearing. The Government gives them land in a long-term rent agreement. Thus, a great number of agricultural entities have growing interests in their own economic activities. The achievement of a high efficiency in the use of funds, resources and finance is the most important interest among all the interests of these enterprises. However, in the list of funds and resources (fertilizers, seeds, mechanisms,equipment, land, etc.) water use is free of charge. Together with water, takes part in production. As a result, the agricultural producer could not understand the concept of a real water cost. This becomes clear upon analysis of organizational and technological interrelationships between repair shops, administrations of exploitation of hydroreclamation systems and pump stations, farmers, rentors, etc.

Let's turn to the existing order. Today the water economy of Uzbekistan is supported by a powerful industrial base, equipped by factories producing reinforced concrete, construction enterprises, and design and research institutes. The multiple systems of hydroreclamation canals and collectors have been built, the length of which is 320 thousand km., as well as water constructions (water reservoirs, pump stations, etc.). More than 100 thousand people are working in this area of the water economy.

More than 90 % of agricultural production comes from irrigated areas. This means that water is a material mean of production in agriculture and plays a great role in industry and utilities. It is evident, that there is a discrepancy between economic management of the state economy and the absence of an economic relationship between water suppliers and water users. One of the main arguments between water suppliers and water users is the fear of a price increase on agricultural products. These fears may seem well-founded, but after a

better study of the problem they can be disregarded. In particular, the evaluation of social costs of growth in the production and formation of costs for agricultural products, and consumer goods made for these products is of great importance.

The following is an example from cotton production and the production of goods from cotton:

1) the Government spends budget funds on the recovery of costs necessary to observe the natural processes, to forecast their development, and on natural resource protection. These costs, and results of efforts of collaborators, are necessary for the whole cotton producing industry;
2) labor costs (from the budget) are considered in making the product- water;
3) agricultural enterprises get water free of charge as a gift of nature, using it to produce cotton;
4) industrial enterprises produce consumer goods from cotton, which are then sold at the stores;
5) water losses at hydrometeorological stations, and in irrigation, and returned waters, that are reformulated as water resources, making the production process possible again.

Therefore, social costs that define the production cost of cotton are summed up from all the elements of costs of all the participants of production.

Existing methods of accounting, and the form of production organization does not allow for all costs. In paticular, they do not account for Government costs, direct labor costs, capital costs, and social support of workers of water entities, i.e. all social costs for water delivery. That s why the buying price for cotton includes not only costs but also profits. These prices are differentiated by the districts and take into account economic and natural conditions. Costs of observating natural processes, their study and forecasting, and creation and establishment of favorable conditions were not taken into account in calculations of purchase prices, and were not recovered by the federal budget, which is collected through taxes from the profits of enterprises, entities and citizens.

After the transition of the water economy to market- driven relations, social costs per one unit of production will decrease - this is proven by the experience of many countries with market economies. As a result of this, the prices of agricultural products should change. However, because of the decrease of social costs, prices will not increase. That can be done only by changing tax policy and state orders. First of all, agricultural buying prices could be increased, and the budget would free itself from financing the water economy. The increase of incomes of agricultural entities and the formation of profits will promote the formation of costs of both simple and large-scale production, social insurance, and workers incentives. A decisive point in the effectiveness of introducing economic relationships is the mobilization of people's creativity and readiness to work, in other words, the human factor.

Thus, the transition to water pricing in the water economy will provide the opportunity to create economic mechanisms and to develop a strategy of management of scarce water resources in the whole Aral Sea region.

Water pricing must become the financial investing basis for water use and water distribution in the Aral Sea Basin. The realization of this principle will promote the creation of a state incorporated water bank with different Aral Sea Basin states which share in its formation, in accordance with the general average contribution to the organizing fund. The criteria for financing and shares should be:

1) The national gross revenue, and
2) The indicator of the economic content of one cubic meter of water resources.

The national gross revenue is known data. The indicator of the economic content of one cubic meter of water resources should reflect the conditions of economic development of water industries and national economies in the republics of the Aral Sea region. This methodology is based on the evaluation of water use and water consumption in two directions:

- as a resource that is necessary for the life of the society
- as a resource used for the production of consumer goods in the economy.

In accordance with these directions a complex evaluation must be carried out of the conditions of economic development of the republics in different periods of the transition to a market economy for a reasonable period of time, and characterized by a relatively stable level of technical progress.

These critical indicators will characterize the level of development and perspectives of regional development, and to establish directions in technical development and the volume of investment. At the same time, this indicator, in combination with the forecasting of water supply and water demand in the Aral Sea Basin, will provide the opportunity to evaluate the necessary share of investment by consumers (nationally or regionally) to accumulate money in a water bank, and to define the following annual shares in accordance with increasing or decreasing demands in water use.

Such a system, or economic mechanism, of water use will promote on the one hand the consumers interests both regionally and on the republic level in the perfection of technological mechanisms of water distribution and ways of highly efficient water resource use, and on the other hand the collection of funds at the bank for the formation of economic mechanisms, improvement of environmental conditions, and social conditions of society by way of benefits and fines to the republics. It may also involve water resources from different basins. Figuratively speaking, the idea is to create an anti-cost mechanism for all consumers. Application of the described mechanisms will allow for the realization of an economic relationship in the water economy and state economy. This will help to treat the water economy as a branch of the state economy and evaluate its services. The options in services payment can be the following:

1) Charges for the right to use irrigation water - purchasing of licences.
2) Establishment of tariffs per hectare of irrigated area as a water charge, depending on the crop,
   a) payment per hectare for one water user,
   b) payment for services to improve the reclamation of a composite hectare,

3) Establishment of differential tariffs in the water economy through agricultural goods sold dependent upon the type of produced goods,
4) Establishment of a one-rate tariff per cubic meter,
5) Establishment of two-rate tariffs per cubic meter and per hectare, and
6) Establishment of phased tariffs and payments.

Topic: The Problems of Introduction of Water Payment in Irrigation in Uzbekistan
Speaker: Yadgar Sabitov

Dear guests,

The development of market relationship in Uzbekistan is taking place in all sections of the economy by stages and on the basis of five principles determined by the President of the republic. In this respect, the Ministry of Water Management of the republic understands the responsibility for carrying our economic reforms and thus studies and takes measures to improve the function of the water management system, and the mutual dependence on water use in all sectors of the national economy.

Under the conditions of water deficit in the Aral Sea Basin, strict measures should be taken to ensure economical and efficient irrigation water use and the population should be guarenteed a safe water supply. For this purpose, the following laws were worked out and adopted by mininstry specialists: "The Law on Water and Water Use" and by the Cabinet of Ministers "On Limited Water Use."

In Uzbekistan, 97% or 4.3 million of hectares are irrigated by water management systems, 2.4 million hectares or 55% are irrigated by machines. It is natural that water economy entities are complicated. Engineering constructions are supposed to be served by qualified experts, this demands considerable subsidies and in the case of a transition to paid water use today, water consumers are unable to maintain the systems themselves.

For several years already, Minvodkhoz has been studying the problems of the introduction of paid water use in the republic, or it is more correct to say, the payment for the service of water delivery. Since 1988, experiments were held for 5 years in 12 districts of the republic. These were designed to help workers of water management and agricultural organizations to gain experience in self-accounting, to get used to paying for water delivery, and to teach people to use irrigation water rationally and efficiently.

The district water management entities and 144 kolkhozes (collective farms) participated in the experiment. The irrigated area covered by the experiment was 350 thousand hectares with limited watershed on the boundaries of economies equal to 3.740 million cubic meters. It should be noted that the experiment had identified several negative factors, for example because of the unprofitable nature of water consumers, the water delivey service payments were made late or not at all. It also appeared that many hydrotechnical workers of collective farms and state farms have a low qualifications, and so on.

While holding experiments, Minvodkhoz also worked on scientific research on water pricing issues. In particular, drafts of the following documents: "On the Temporary Order of the Transition of the Agricultural Complex to Paid Water Use", " Regulations on Paid Water Use", (approved by the Ministry of Justice)", "Temporary Regulations on Economic Sanctions to Agricultural Entities for Violation of Normal Water Use and Compensations for Damages Caused by Insufficient Delivery of Water by Water Management Organizations ", " Typical Agreement for Water Delivery Services to Water Consumers in Agriculture", " The Order of Collaboration Between Exploitational Entities and Water Consumers , Depending on the

Financing System ", "The Regulations for Irrigation Water Use Control" (approved by the Standards Committee), and some other documents.

In accordance with a resolution put forth by the Cabinet of Ministers, the document "Assessment Criteria for Irrigation Water Costs for Different Types of Water Consumers" is being worked out. The majority of technical-economic indicators have been determined: complete costs of exploitation of water economy entities when depletion of capital funds is taken into account; an insurance fund to provide a sustainable financial situation for exploitational water economy entities in low water years; a reserve fund to provide repair works to abolish the consequences of natural calamities, storms, breakdowns, and floods; an investment fund to provide emergency reconstruction of former capital funds; costs for an extended reproduction of capital funds of the water management sector; normal incomes of exploitational water economy entities; taxes and obligatory deductions; and limits on water delivery on boarders between water consumers and areas of irrigated lands. The limit of water delivery and area of irrgated land are on the list of assessment criteria as elements in determining the cost of delivering water under unique circumstances.

Minvodkhoz of Uzbekistan has been studying water pricing issues for more than ten years already and it is reasonable to ask why haven't any measures been taken to introduce paid water use. In the whole world there is not a unified approach to the system of water cost management, use and water delivery. Each state is different from others in its historical development, economic conditions, water resource supply, structure of agriculture and technical level of irrigation systems.

Uzbekistan also has its peculiarities, historic traditions, and new economic situation. The current period of reforms is affecting all spheres of economy. Unlike the majority of countries, agriculture in Uzbekistan is completely based on the machine irrigation (or artificial), there is no precipitation during the vegetation period. All these peculiarities demand further study of water pricing problems.

Besides those mentioned, the transition to paid water use during periods of economic reform is related to additional difficulties: the prime price of agricultural production will rise. Since world prices have been set for these products and the water consumer's solvency is not guaranteed, and this situation will reflect upon the promptness of water delivery; the maintenance of water systems; the imperfect relationship between the ministry and the association of farmers which is not completely organized; lack of preparedness of agriculture to treat water as a service, with price, tarriffs, etc.; the ongoing increase of prices for technical resources coming from the countries of the former Soviet Union, in most cases have already exceeded the world prices.

Some specialists and scientists in Uzbekistan stress that a complete transiton to paid water use will save water. It should be noted that strict limits on water use resulted in a decrease of 12-13 thousands of cubic meters which is much lower than in India, China, and Turkey where the water use is paid. Other than Uzbekistan, I do not know of another country in the world where water system maintenance is handled only by water consumers. In all countries, water is to some extent regulated, managed by the government or by the society through subsidies, laws, and administrative management.

The transition to paid water use can not be the only economic measure for complete maintanance of the water economy. The main reason for this is the fact that it is aimed at regulating water use conditions in deficit. Nevertheless, paid usage will strengthen the discipline of water consumers by limiting water use. At present, Minvodkhoz is working on the problem of partial introduction of paid water use by introducing a single tariff for all water users to compensate the workers of exploitational water facility services. Finally, we tend to think that all of the costs of water system maintenance should be covered by water users, particularly state farms and collective farms.

The final cost of cotton production is several times more expensive than the cost of raw cotton. For example, the manufacturers of cotton oil and clothes have no responsibility for water system maintanance. What share of water management costs are reflected in the final products of agriculture, and in what way should the whole society, not just agriculture, support water management? Should this be done through taxes? If so, then the water economy will never run on a self-accounting basis. In order to introduce self-accounting it is necessary to work out a mechanism for transition in which the whole society is equally responsible for water system maintenance. This is the chief problem the Government of Uzbekistan and ministry specialists aim to solve it.

Topic: **Pricing Policies for Irrigation Water**

Speaker: **Larisa Sosnitskaya,**
Institute of Economics of the Academy of Sciences,
Turkmenistan

In irrigation, water pricing should promote self-financing of the water economy and conservation of irrigation water. The most popular methodology known is based on costs connected with water delivery and the return of these financial resources to water management entities. The institute believes that this methodology partially solves the problem because it does not stimulate agricultural water users.

At the Institute of Economics of the Turkmenistan Academy of Sciences, Professor Atayev's research group has worked out a theory of paid water and natural resource use. Irrigation water use is included. The theory is based on rent theory, which allows for the economic interest of water managers and agriculture. It starts with the idea that in irrigated agriculture, there is not only land rent but water rent. Water rent is reflected in the final cost of agricultural products. To calculate the water rent, it is necessary to isolate the cost of agricultural productes. It is important that this method be used by the water consuming entities for them to save water.

In this case, the known formula of water price Tsv=Z (or water use price equals exploitational cost) becomes complicated, getting a rent part equally with a cost part. It looks like this:

$$Ts_v = Z + R_d + R_n$$

where: Ts_v is a water use price
Z is an exploitation cost
R_d is a differential water rent
R_n is an undefined water rent

We shall comment later on the first item. Now we shall explain the specific character of calculations of water rent. The formation of a differential water rent mainly is related to the differences in natural conditions of water supply. That is why in proportion it is always different in each case. The size of differential water rent can be measured by the difference between costs of water delivery between water consumers who operate in worse natural conditions, and the rest of the water consumers. It should be noted that in the worst conditions the differential water rent does not exist.

In contrast, an undefined water rent, in equal proportion to all water consumers, is determined in an indirect way; by subtracting known exploitation costs and differential water rent from the water price, measured by the demand for the introduction of new irrigation technologies. In this case, the choice of new technology(ies) is determined mainly by natural conditions. Therefore, in Turkmenistan, the relationship between water resources and land area is disproportionate. Because of this the efficiency of such technologies should be the maximization of water saved by volume under the condition that the cost of these technologies does not exceed the cost of water saved, or is compensated for by the increase of incomes that could be received if new territories were watered with the water that had been conserved. As a result of this, the price for water use can be the following:

$$ЦВ = (Ен \times K + or - З) / B$$

where:

	Ен	is a normative co-efficient of the efficiency of capital costs
	K	is a capital cost, directed on the introduction of new irrigation technologies, providing water conservation
	З	is an increase or reduction of current costs, connected with changes in irrigation technology
	B	is the volume of conserved water

As to the production cost related to the of the price of water use /1/, then, the formal role of a historical price under state budget financing of the water economy gains a new content under paid water use. Paid water use is not only becoming an important indicator in the development of water economy entities, but is achieving the final objective of water policy - maximum water conservation. This is because the size of the differential water rent depends upon the cost of water and the size of the differential water rent together with the undefined water rent, determines the opportunities for financing measures to preserve nature. Because of this, it is necessary to clarify methods of cost accounting in calculating the prime cost of water delivery.

The characterists of costs for different uses, are not covered in this paper, but they are helpful in identifying costs closely connected with water delivery, and improving water quality, and relating the costs of water drainage to payment for land.

To calculate the prime cost of water delivery, for different exploitational parts of the water system using a traditional approach, then we divide the individual projected/normative or actual costs of exploitation by the projected or actual water volumes delivered to the territory served. Under new conditions, we think that, besides traditional expenses, the costs of amortization of capital funds of water management should be included in the prime cost. But the most important thing is to reallocate exploitational costs among the parts of the irrigation system. Without such reallocation, fluctuations of the prime costs of water delivery in different parts of a system are not objective and, in major parts, they could be higher than at the end of the system. The reason for this is that local costs for a definite part of the system are not reallocated and are calculated only for water consumed within the borders of this part without taking into account the whole water volume that is transported through its water facilities and equipment. So,for example, water volumes transported through the facilities of each higher elevated part exceed the real water need for irrigated areas within its borders. Transit costs should also be reallocated among all water consumers of the system, as well as costs connected with activities of water management entities, that have a common purpose, for example, different services, labs, and expeditions. Furthermore, if it is possible to reallocate costs in proportion to the volume of water delivered to this or that part of the irrigation system, then, in order to reallocate the costs of transport for each higher-elevated part, it is necessary to correlate the costs of that specific part not only with water volume consumed, but also with whole water quantity flowing to its territory, including water transported to other lower parts of a system through this part.

At the lower elevated part, that plot's costs are added to the prime costs calculated in the higher elevated parts of the system. This sum is divided by the whole water volume, flowing to the given part. including water flowing to lower elevated parts, and so on. In this case, the prime cost of water delivery in the upper parts of the irrigation system will considerably decline in comparison with the existing level.

Schematically the structure of water price in irrigation could be the following :

Irrigation systems or parts	Prime cost of water delivery	Differential water rent	Undefined water rent	Water consumption price
1	.5	1.0	.3	1.8
2	.7	.8	.3	1.8
3	.9	.6	.3	1.8
4	1.0	.5	.3	1.8
5	1.5	-	.3	1.8

Indicators of prime costs of water delivery and differential water rents are different for each exploitation part of the system. This system is made up of parts of equal size, which in conjunction with an undifferentiated water rent that is equal for all parts, form a single water consumption price. The benefits of such indicators are quite evident: its practical use is facilitated, natural individual characteristics of each water consumer are taken into account and so on. The complicated structure of water prices means that rational organization of collecting revenues is necessary. We see it as follows:

Contracts should be the basis of charged relations in water use reflecting the interests of cooperating sides. Contracts foresee volumes, periods of water delivery, the price and all its components, including fines, benefits and so on. After all payments between water deliverers and agricultural water consumers are made, finances are then concentrated in the primary water management entities. Their share, which is equal to the rent part of the whole sum of payment, is taken as a tax by the government and forms a special fund. The remaining part of finances for water use is the financial basis for self-supporting activities of the water entities.

The introduction of this project at the present time could meet with difficulties connected with the limited opportunities in the use of new watering technologies. Besides this, there is a lack of financing, and an absence of the necessary technical basis, which are caused by state sector and government problems. That is why the transition of irrigation to charged water use will not occur in the near future. However, gradual introduction of simple, cheap technologies to provide for water conservation, which can be realized with the existing finances, is not only important but necessary. At the same time it is necessary to focus the primary water entities on self-accounting, and to transfer them over to a system of self-financing, while introducing elements of paid water use.

Abbreviations/Acronyms

CAR	Central Asian Republics
CID	Consortium for International Development
EPT	Environmental Policy and Technology Project
GOK	Government of Kazakstan
GOKy	Government of Kyrgyz Repulic
GOTk	Government of Turkmenistan
GOTj	Government of Tajikistan
GOU	Government of Uzbekistan
ICAS	Interstate Council for the Problems of the Aral Sea
NGO	Nongovernmental organization
NIS	Newly Independent States
ICAS	Interstate Council for the Problems of the Aral Sea
IRG	International Resources Group
USAID	United States for International Development
USEPA	United States Environmental Protection Agency
USG	United States Government

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