CHAPTER 4 INSTITUTIONAL AND MANAGEMENT IMPROVEMENTS AND REFORMS

4.1 Introduction

Giving emphasis to the Study Area, issues, prospects and some suggestions for institutional and management improvements and reforms that are considered necessary in the water supply sector pertaining to water sector policy planning and management; national infrastructure; water resources; local production and distribution infrastructure; customer services; sector support from central and regional administration; management of waterworks at regional and local level; and organization etc., are discussed in the Main Report. Some salient points presented below.

To implement some of these suggestions or recommendations it is necessary to rectify current problems due to prevailing financial constraints and organizational difficulties such as lack of competent staff with experience in working under market economy conditions. The priorities should be established for gradual implementation taking into consideration of the regional and institutional characteristics.

4.2 Issues, Prospects, Necessary Improvements/Reforms and Their Importance

4.2.1 Water Supply Policy and Systems

(a) Policy and Strategy Management in Water Sector: Effective mechanisms are important to ensure that all sub-sectors and agencies can provide appropriate input and influence over the water sector policy and strategy management. Water policy analysis and development capability must be strengthened to enable promulgating of comprehensive and long-term national water policy.

(b) Legislation and Regulation Development: The legislative changes that have been introduced to implement the policy changes towards market economy need to be supported by effective implementation and change management plans. Further legislative improvements may be considered particularly at early stages if proposed changes do not take place effectively.

(c) Donor Coordination and Management: To utilize effectively and efficiently the enhanced external assistance that is flowing into the water supply sector, it is

important not only to identify, delineate and prioritize the areas and scope of cooperation by the donors, but also to maintain accountability of entity/ies at central level which shall be responsible to interface, negotiate and coordinate with donors and among the agencies related to the sector in managing such donor involvement.

(d) Subsidization: Water tariffs for Group(1) consumers need to be increased reasonably as they are currently very low and counterproductive in water conservation efforts and the Vodokanals' efforts towards self sustainability, while other consumers are forced to compensate for with higher tariffs. But at the same time, the state need to devise a system for giving subsidies exclusively to low income earning households till they become economically sound to pay the water charges fully, by making required changes to the present social protection system to suit market economy conditions.

(e) Separate System for Drinking Water Supply: Current irrational use of costly treated drinking water for gardening must be eliminated. Existing water supply policy must be implemented to restore the two separate distribution systems for drinking water and gardening water. Territorial departments responsible for gardening water supply must be reactivated to handle repair, restoration and maintenance of existing facilities and systems or construction and maintenance of new distribution facilities and their management. Policy considerations and intermediate measures are needed to deliver drinking water meeting the standards until Tuyamuyun/Kaparas water becomes available to remote areas like Muynak in the future.

4.2.2 National Infrastructure and Water Resources

(a) Development of Water Resources: The Government of Uzbekistan (GOU), through the MWM&M, the SCGM and the SCNP, must retain and continue the ability at the national level to regulate, plan, control, manage, protect and develop the national water resources, and be responsible for the direct cost of these functions.

(b) Planning, Development and Construction: Clear accountability must continue for planning, development and construction of national infrastructure as against local infrastructure for water supply and sewerage service delivery.

(c) Operations, Maintenance and Management: These functions related to inter-regional infrastructures that are common to two or more administrative territories are presently the responsibility of the central government. Even after the TWSS is completed, it would be desirable to retain the responsibilities of administering

DOMIWRPs-T/N and T/U with the RPADORWP at national level until the territorial administration build up overall capability handle them.

4.2.3 Local Distribution Infrastructure and Customer Service

(a) Planning, Development and Construction: Vodokanals still depend largely on the center for advice on planning, design and development functions. Their construction and planning activities are now basically limited to routine planning and construction/rehabilitation works, a reason being the non-availability of funds. Powers to handle infrastructure planning may be given to Vodokanals when they become self-sufficient in management with adequate in-house capability for long term planning.

(b) Corporate Planning: Preparing and executing a corporate plan is fundamental in delineating and achieving corporate management objectives including self-sustenance. Capability of Vodokanals to conduct consumer/market needs assessment studies (water demand characteristics by consumer group, level of service both in quality and quantity, appropriateness and impact of tariff changes on service level and consumer response etc.,) need to be further developed.

(c) Operations, Maintenance and Management: Waterworks in the Study Area suffer from lack of funds and material supplies and difficulties in organizing supply systems to suit the conditions after decentralization. Clear accountability must be maintained for repair and maintenance, operation and management of infrastructure for local water and sewerage service delivery and for the support systems for supplies.

4.2.4 Sector Support

(a) Consultative Role of the MPU of the ROU/RPADORWP

The shift in role of the MPU of the ROU from direct management to consultation and support must continue with enhanced assistance provided to waterworks in problem-solving and facilitating technology and experience exchanges from one territory to another. Training of present staff and/or employing specialists knowledgeable in market economy is desirable for delivering required support services efficiently and effectively. The MPU of the ROU and territorial administration must identify and implement the necessary institutional strengthening and extension of autonomy of the Vodokanals.

For shifting of water supply responsibilities from Agro-Vodokanal to the Vodokanal, if required, in the gradually urbanizing rural areas, Consultative role, policy guidance and coordination of the MPU of the ROU are essential at central level.

(b) Consumer Relations and Service Management: Consumer management operations must be well supported by a strong enforcement mandate and programs to comply with regulations and instructions on payment for services and works delivered.

4.2.5 Management of Waterworks

(a) Understanding the Need for Changes

Waterworks in the Study Area, as self supported enterprises, must develop new systems and methodologies fitting to market economy conditions. Although efforts are made to improve management, some plans cannot be implemented right now due to lack of funds and material resources, technology and staff competent to work under the conditions of market economy. To improve management of waterworks, the managerial staff at all levels must realize the need for changes, be aware of and be alert to issues and problems that hinder efficient management. Efforts must be made by themselves to identify these and device solutions, as solutions are often found among the staff involved with routine activities and gained enough experience through trial and error.

(b) Management Structure: Increased attention is required on staff assessment and position qualifications to ensure that talent, knowledge and skills are being properly matched with the job requirements. Staffing decisions and practices, and cadre adjustment policies must be reviewed to achieve optimum work force. To maximize effective utilization of staff talent and experience, mechanisms need to be introduced to encourage staff participation in management decision making. Redundant staff must be considered for effective redeployment elsewhere complying with social security regulations etc., with the advice of the concerned authorities.

(c) Management Development/Training Program: Management staff must be given training to develop a base of management skills for achieving better results. The responsibilities, functions and duties of lower management staff must be well defined and delegated to relieve the top management to act on more important matters and crucial issues. As low salaries can not attract skilled/competent staff, staff must be encouraged to gain higher qualifications compensated with higher rank salaries. The

training institute under the MPU of the ROU and its affiliated regional centers must be strengthened for the benefit of concerned waterworks.

(d) Personal Performance Evaluation System: Towards results orientation, an evaluation scoring system must be devised to assess employee performance, based on which the employees passing or failing would be suitable treated with privileges and benefits or motivation/penalties.

(e) Incentives to Staff: Appropriate incentive schemes are needed to compensate MPU and Vodokanal employees with salaries and privileges commensurable with their duties and responsibilities, in comparison to those in the private sector.

(f) Transfer of Technology: Knowledge on modern management and operation techniques and their appropriate applications need to be promoted through transfer of technology taking the best opportunities of foreign technical assistance programs.

(g) Billing and Collection: To improve financial status of Vodokanals, efficient billing and collection system is needed while attending to consumer relations, service improvement, and cost containment to lessen severity of future water tariff increases.

(h) Marketing and Public Relations: Enhanced consumer education capability based on water conservation and water use policy need to be built up. Public awareness campaigns are essential to achieve proper understanding and cooperation of consumers regarding services delivered, their lapses, difficulties confronted and efforts taken by the Vodokanal to solve the consumer problems. The need to "use the water wisely and pay for it" must be emphasized to mitigate trend for negative reactions by consumers during tariff increase and to develop in their mind an enhanced willingness to pay. A well designed complaints monitoring and analysis system is needed to gather basic information on the roots and causes of complaints and to expeditiously attend to them.

(i) Reduction of Non-essential/Non-revenue Water Use: Reduction of non essential water use is vital to financial solvency of waterworks. Installation of water meters to all connections must be prioritized and combined with repair or replacement of damaged/outdated pipes and fittings. A systematic program for reduction of non essential water use is desirable, along with a unit in each Vodokanal to plan/program procurement and installation, maintenance and repairs of the water meters. Vodokanals responsible for installation of water meters in their service area must be

supplied with water meters for which additional funds would be required. Sharing of such costs by the consumer and the waterworks and other related financial and technical issues must studied and guided at national level. In public institutions there is general tendency to waste water in large volumes by neglect. Water meters must be installed in these not only to discourage non-essential use and wastage but also to ensure collection of appropriate water charges.

(j) Management Information System (MIS): MIS is needed for capability development of Vodokanals in corporate planning, management development, commercial operations, timely problem solving, presenting correct perspective of affairs and in countering irrational directives and external pressures etc.

(k) Research and Development (R&D): R&D requirements in the water supply sector need to be identified at national level and the capability of relevant institutes for R&D must be strengthened by effective pooling of the limited resources available.

(l) Computer Assistance for Management and Technical Services: A computerized system need to be developed for ease of operation, with simple menu driven modules for metering, billing, payment and installment planning, consumer complaints, technical service and management information reports etc. Application of computer assistance in technical areas must be encouraged in order to implement water supply and sewerage system modeling, system mapping and CAD programs etc.

(m) Improved Communications: Improved communication among the DOMIWPs and the Vodokanals and their branches scattered over vast service areas is essential for higher management performance and better service delivery.

(n) Protection of Water Resources: To protect Kaparas water source from possible environmental pollution, active involvement of Turkmenistan counterparts would be necessary in planning and implementing joint environmental conservation and pollution control programs. Construction of the proposed collectors for diverting polluted drainage water away from Amu Darya River must be expedited on priority.

(o) Water Quality Monitoring: Technical solutions and a system for maintaining improved water quality through improvement of facilities are proposed in the present Study. Laboratories that are directly involved in water quality monitoring and control in the Study Area and now suffering due to lack of trained personnel, poor equipment etc. must be strengthened with suitable staff and essential equipment and facilities. A

system must also be evolved for collection, documentation and exchange of water quality management information. The resources, logistics and facilities for testing, analyses, reporting must also be identified and organized.

4.2.6 Organization of Waterworks

(a) Organization Structure

Waterworks have developed their organization structures through long experience. But, for efficient and effective performance of corporate functions, structural modifications are needed from time to time to meet new functional requirements. Reorganization issues must be taken up at waterworks meetings and be deliberated thoroughly involving all levels of staff before agreeing to a new structure, which may later found to be unworkable. All key changes must be approved by higher authorities.

It is desirable to strengthen the repair and maintenance workshop facilities and construction units in the Vodokanals so that these can attend to minor construction, repair and maintenance works more effectively and efficiently.

(b) Strengthening of District/City Offices of Vodokanal: Water supply and sewerage services in the district and city centers are operated through local offices subordinated to the Vodokanals. With gradual growth of consumer connections handled by the District/City Offices of Vodokanal, these area offices need to be strengthened with the transfer of major responsibilities.

CHAPTER 5 PROJECT COST ESTIMATION AND IMPLEMENTATION PLAN

5.1 Construction Cost Estimation

The construction cost of the Rescheduled Project was estimated as below. The breakdown of this cost as shown in Table 5.1.

First Priority Project (FPP: 1997-2002)	:	US$ 277.8 million
Second Priority Project (SPP: 2003-2010)	:	US$ 324.8 million
Total	:	US$ 602.6 million

5.2 Implementation Plan

The Rescheduled Project is implemented in two stages as below. For details, see Fig. 5.1.

First Priority Project

(1) To improve the quality of water, change the main water source from the Amu Darya river to the Kaparas reservoir
(2) Expand the T-U water treatment plant to ease the tight water supply and demand of Khorezm.
(3) Reduce the amount of leakage by replacing aged distribution pipelines and expansion of water supply area.
(4) Impose correct water tariff on the residents by installation of water meter.

Second Priority Project

(1) To ease the tight water supply and demand in Karakalpakstan
(2) Rehabilitation works for water treatment plants
(3) Same as (3) and (4) in the works in the First Priority Project

The expansion schedule of the water supply capacity based on the project implementation schedule and the planned water demand are shown in Table 5.2 (Karakalpakstan covered by T-N system) and Table 5.3 (Khorezm covered by T-U system).

Table 5.1 Construction Cost

(unit: million US$)

Work Item	Total	FPP	SPP
1. Kaparas Raw Water Intake System			
1.1 Kaparas Intake Station	12.9	12.9	
1.2 Raw Water Mains Pipeline			
1.2.1 Kaparas IPS to T-N Existing IPS	18.7	18.7	
1.2.2 Kaparas IPS to T-U Existing IPS	1.6	1.6	
1.2.3 Kaparas IPS to T-U Existing IPS	12.7	12.7	
Sub-Total	45.9	45.9	
2. T-N Water Supply System			
2.1 Water Treatment Plant			
2.1.1 Rehabilitation	15.5		15.5
2.1.2 Expansion	44.6		44.6
2.2 Transmission and Distribution Pumping Station			
2.2.1 No. 2 Booster Pumping Station	9.5		9.5
2.2.2 Nukus North Distribution Station	10.8	10.8	
2.2.3 Kungrad Transmission and Distribution Station	10.5	10.5	
2.3 Transmission Pipeline			
2.3.1 WTP - No. 1 Pumping Station	82.7		82.7
2.3.2 Nukus - Takhiatash L=21 km	14.7	14.7	
2.3.3 Kungrad - Muynak (Q=8,870 m^3/d)	28.5	28.5	
2.3.4 Kegeili - Bozatau	15.0		15.0
Sub-Total	231.8	64.5	167.3
3. T-U Water Supply System			
3.1 Water Treatment Plant			
3.1.1 Rehabilitation	15.5		15.5
3.1.2 Expansion	56.8	56.8	
3.2 Transmission Pipeline			
3.2.1 WTP - Khazarasp Pumping Station	27.6	27.6	
3.2.2 Khanki - Urgench	8.1	8.1	
3.2.3 Yangiaryk - Khiva	7.3	7.3	
3.2.4 S.P.1 - Koshkupyr	5.2	5.2	
3.2.5 Gurlen - Shavat	3.3	3.3	
Sub-Total	123.8	108.3	15.5

IPS : Intake Pumping Station
WTP : Water Treatment Plant
FPP : First Priority Project
SPP : Second Priority Project

Table 5.1 Construction Cost (Continued)

(unit: million US$)

4. Vodokanal Karakalpakstan			
4.1 Water Treatment Plant			
4.1.1 Nukus WTP (Rehabilitation)	17.7		17.7
4.1.2 Chimbai WTP (Rehabilitation)	1.6		1.6
4.1.3 Water Treatment Plant (Rehabilitation), 3 Cities	6.6		6.6
4.2 Distribution Network			
4.2.1 Replacement D=100~D=400	53.2	20.5	32.7
4.2.2 Expansion D=100~D=400	28.0	10.8	17.2
4.3 Metering System			
4.3.1 Meter Installation D=20	10.3	3.9	6.4
Sub-Total	117.4	35.2	82.2
5. Vodokanal Khorezm			
5.1 Water Treatment Plant			
5.1.1 Urgench WTP (Rehabilitation)	19.7		19.7
5.1.2 Chalish (Rehabilitation)	1.9		1.9
5.2 Distribution Network			
5.2.1 Replacement D=100~D=400	39.9	15.3	24.6
5.2.2 Expansion D=100~D=400	16.8	6.5	10.3
5.3 Metering System			
5.3.1 Meter Installation D=20	5.4	2.1	3.3
Sub-Total	83.7	23.9	59.8
Total	602.6	277.8	324.8

IPS : Intake Pumping Station
WTP : Water Treatment Plant
FPP : First Priority Project
SPP : Second Priority Project

Fig. 5.1 Implementation Schedule

Description \ Year		First Priority Project						Second Priority Project							Remarks
		0 1997	1 1998	2 1999	3 2000	4 2001	5 2002	6 2003	7 2004	8 2005	9 2006	10 2007	11 2008	12 2009	13 2010	
Loan Arrangement																
Preparation of Tender (Bids, Evaluations)																
1. Kaparas Raw Water Intake System																
1.1 Kaparas Intake Station	Q=350,000 m³/d															
1.2 Raw Water Mains Pipeline																
1.2.1 Kaparas I.S. to T-N Existing Intake Station	D=1,400 L=10.7 km															
1.2.2 Kaparas I.S. to T-U Existing Intake Station	D=1,400 L= 1.0 km															
1.2.3 Kaparas I.S. to T-U Existing Intake Station	D=1,400 L= 9.0 km															
2. Tuyamuyun-Nukus Water Supply System																
2.1 Water Treatment Plant	Q=350,000 m³/d															
2.1.1 Rehabilitation	Q=200,000 m³/d															
2.1.2 Expansion	Q=150,000 m³/d															
2.2 Transmission and Distribution Pumping Station																
2.2.1 No. 2 Booster Pumping Station	Q=234,410 m³/d															
2.2.2 Nukus North Distribution Station	Q=122,950 m³/d															
2.2.3 Kungrad Transmission and Distribution Station	Q= 42,130 m³/d															
2.3 Transmission Pipeline																
2.3.1 W.T.P. - No. 1 Pumping Station	D=1,400 L= 63.0 km															
2.3.2 Nukus - Takhiatash L=21 km	D=1,200 L= 11.0 km															
2.3.3 Kungrad - Muynak (Q=8,870 m³/d)	D=500 L= 96.5 km															
2.3.4 Kegeili - Bozatau	D=400 L= 50.0 km															
3. Tuyamuyun-Urgench Water Supply System																
3.1 Water Treatment Plant	Q=400,000 m³/d															
3.1.1 Rehabilitation	Q=200,000 m³/d															
3.1.2 Expansion	Q=200,000 m³/d															
3.2 Transmission Pipeline																
3.2.1 W.T.P. - Khazarasp Pumping Station	D=1,200 L=27.0 km															
3.2.2 Khanki - Urgench	D=1,200 L=13.2 km															
3.2.3 Yangiaryk - Khiva	D=600 L=20.0 km															
3.2.4 S.P.1 - Koshkupyr	D=600 L=14.0 km															
3.2.5 Gurlen - Shavat	D=600 L=19.5 km															
4. YodoKunal Karakalpakstan																
4.1 Water Treatment Plant																
4.1.1 Nukus W.T.P (Rehabilitation)	Q= 65,000 m³/d															
4.1.2 Chimbai W.T.P (Rehabilitation)	Q= 2,200 m³/d															
4.1.3 Water Treatment Plant (Rehabilitation) , 3Cities	Q= 14,000 m³/d															
4.2 Distribution Network																
4.2.1 Replacement D=100 ~ D=400	L=228.8 km															
4.2.2 Expansion D=100 ~ D=400	L=119.6 km															
4.3 Metering System																
4.3.1 Meter Installation D=20	N=115,960 Pieces															
5. YodoKunal Khorezm																
5.1 Water Treatment Plant																
5.1.1 Urgench W.T.P (Rehabilitation)	Q= 50,000 m³/d															
5.1.2 Chalish (Rehabilitation)	Q= 11,000 m³/d															
5.2 Distribution Network																
5.2.1 Replacement D=100 ~ D=400	L=170.3 km															
5.2.2 Expansion D=100 ~ D=400	L= 71.5 km															
5.3 Metering System																
5.3.1 Meter Installation D=20	N=60,970 Pieces															

Fig. 5.2 Water demand and planned expansion capacity of W.T.P. in Karakalpakstan

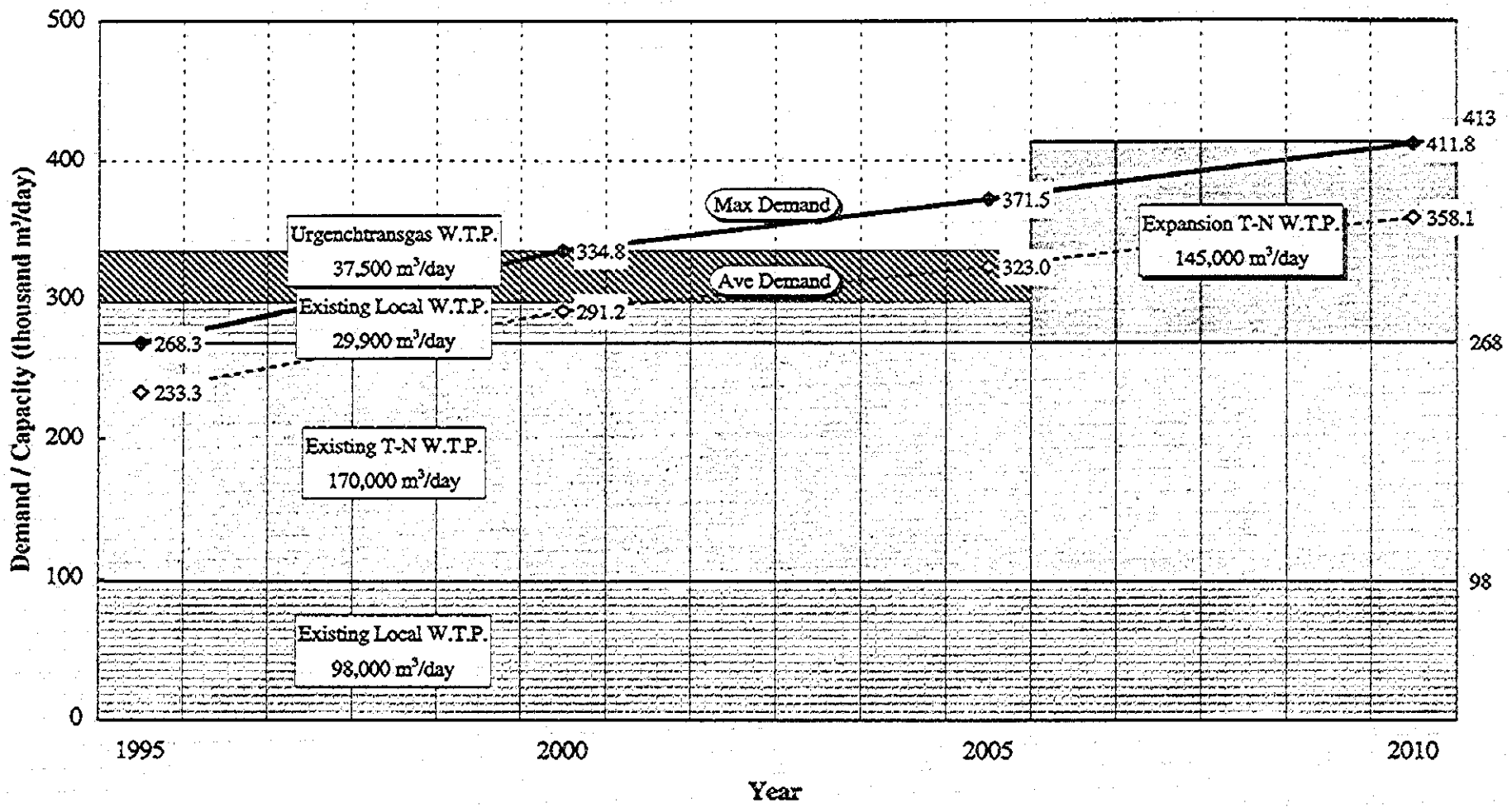
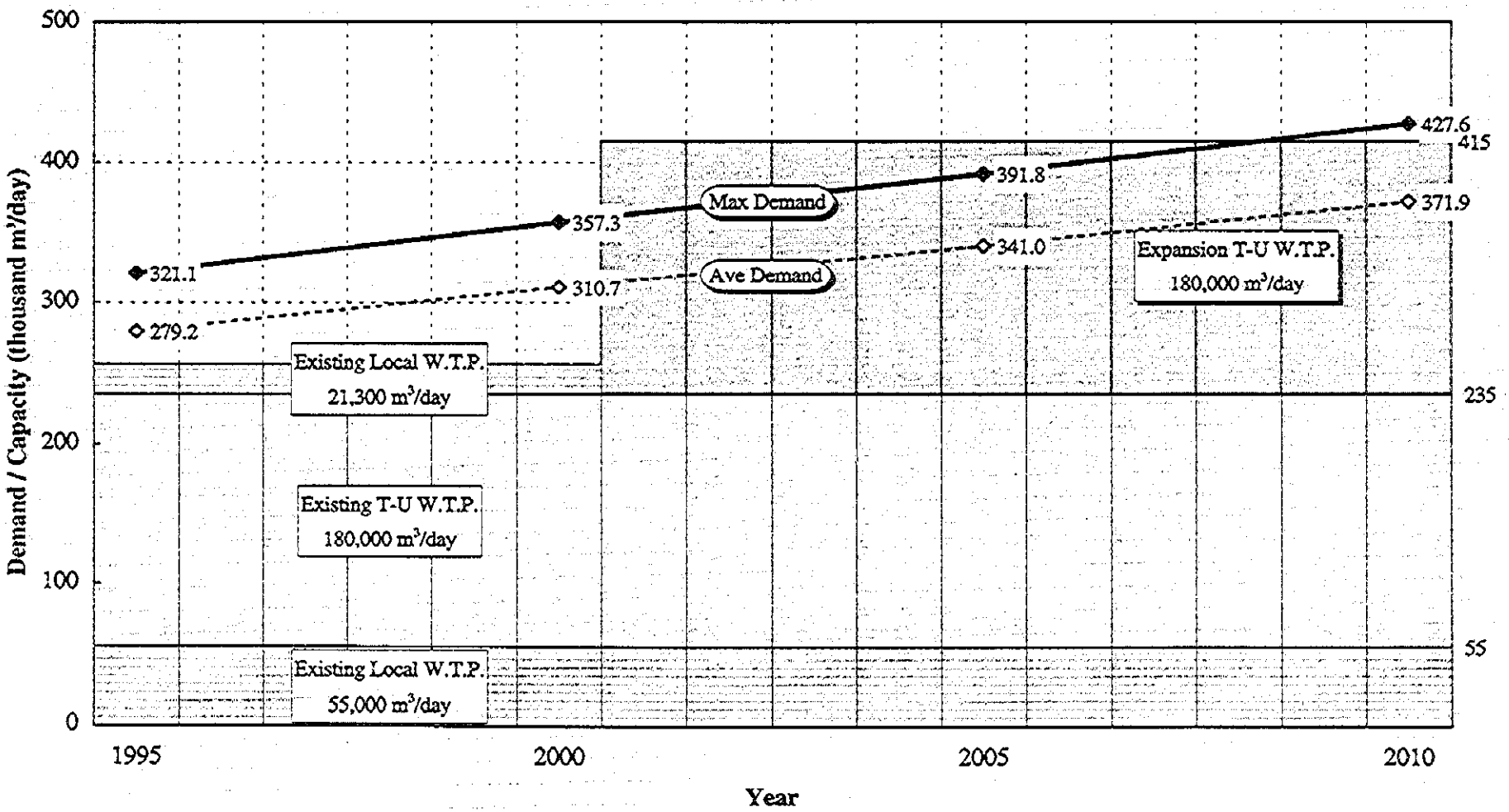


Fig. 5.3 Water demand and planned expansion capacity of W.T.P. in Khorezm



5.3 Operation and Maintenance Costs (O&M)

The O&M costs in future are estimated based on costs per unit quantity of accounted - for water (AFW).

(1) Tuyamuyun Water Supply System

1. Electricity charges: The increase in electricity charge of the Kaparas IS is added. The increase in electricity charge of the Proposed PSs is added.
2. Wages: Present unit expense per unit quantity of AFW is used.
3. Chemicals: The appropriate cost of chemicals per unit quantity of AFW for the water quality of Kaparas reservoir is used.
4. Repairs: The actual unit expense of repairs for existing facilities is used. Repair expense for new facilities is taken as 0.5% of the cost of new facilities.
5. Social insurance costs: Present unit expense per unit quantity of AFW is used.
6. Fuel, gas, lubricating oils: Present unit cost is used.

The O&M costs per unit quantity of AFW for each item are set as given below.

Table 5.2 O&M Costs Per Unit Quantity of AFW of Tuyamuyun System Before and After the Implementation of the Project

(units: Sum/m^3)

Expenditure item	T - N		T - U	
	Before project implementation	After project implementation	Before project implementation	After project implementation
Total	4.186	4.143+α	2.864	2.535+α

The additional electric charges after completion of proposed pumping stations are added in these figures.
α : repair cost

(2) Vodokanal System

The values for 1996 are used in principle, for calculating the cost per unit quantity of AFW for the Vodokanal system in the future.

Table 5.3 O&M Cost Per Unit Quantity of AFW for Vodokanal

(units: Sum/m^3)

Expenditure item	Karakalpakstan	Khorezm
Total	2.354	1.122

CHAPTER 6 PROJECT EVALUATION

6.1 Technological Viability

The proposed system and facilities are judged as technologically viable for the Study Area and the country as there are no major problems with respect to technological aspects.

6.2 Financial Feasibility Analysis

6.2.1 Introduction

Based on the project evaluation in Chapter 9 of the Part 1, and on the discussions between Uzbek side and JICA team held in Oct. 1996, the Basic Plan was revised and rescheduled on the implementation.

This rescheduled project was analyzed in details from the financial and economical view point.

Analysis was made on the 4 entities and on the 3 projects.

・four entities ;

Group-A	Group-B
(a)DOMIUP-T/N (Referred to as T-N)	(b)DOMIUP-T/U (Referred to as T-U)
(c)Vodokanal-ROK (Referred to as KKP)	(d)Vodokanal-KZ (Referred to as KZ)

・Three Projects;

Case 1. Phase-1 of Basic Plan	: 1998 ~ 2000 year	US$ 607.1 mil.
Case 2. Rescheduled Project (FPP & SPP)	: 1998 ~ 2010 year	US$ 602.7 mil.
Case 3. Rescheduled Project (FPP only)	: 1998 ~ 2002 year	US$ 277.8 mil.

6.2.2 Method of Analysis

There are 2 methods of analysis to be adopted.

(1) Previous Method (Applied to Case 1)

Same as Chapter 9 of Part 1 Basic Plan. Firstly, presuming the viability condition of Vodokanal under the given discount rate with the assumed water rate, then by such obtained water selling rate, FIRR of DOMIWP should be checked to see the feasibility. Namely, first preference was given to Vodokanals for their

self-payment and that of DOMIWPs should be depending on the various factors including political decision. As a management analysis, this method is an orthodox approach in the economy market.

(2) Changed Method (Applied to Case 2 and 3)

According to the request of Uzbek side in Oct. 1996, the analysis was made by reverse operation. Namely, firstly presuming the viability condition of DOMIWPs under the given discount rate, then by such obtained water buying rate, level of Ave. water tariff should be checked under the fixed rate of FIRR. At the same time, considering the request of Uzbek side, comparison of analysis was made regarding the three cases of subsidies (0, 50 and 100%) to the construction cost.

6.2.3 General Assumptions for the Analysis

The following assumptions were made in the analysis.

(a) Project life	: 30 years
(b) Base year	: 1998 (start of construction)
(c) Base of cost estimate	: 1996 price (unescalated)
(d) Monetary unit	: US Dollars (US$)
(e) Rate of Exchange	: 1 US$ = 40 sum (as of July. 1996)
(f) Water tariff	: Assumed as discussed in Section 9.3 of the Main Report (Part I) and shown in Table 9.1 and 9.2 and in Section 6.2.4 of Part II.
(g) O&M cost	: Operation and maintenance cost is determined based on actual expenditure shown in the financial statements and assumed to be made up of two components; O&M cost (Basic Cost) that depends on the volume of water sold (accounted-for water), and additional annual cost of replacement and maintenance of facilities and water meters replacement as discussed in Section 6.2.5. For details refer to Chapter 5 Section 5.4, Part II of the report.
(h) Discount rate	: As discussed in Section 6.2.2 (2). Adopted 3 discount rate of 5, 10, and 15 % p.a.(Case 2 and 3), 7.5% .p.a.(Case 1)

(i) Period of Forecasting the Financial Statement

: 15 years (Up to 2 years after the implementation)

(j) Construction Cost : (Three projects)

Case 1 ··· Phase I of Basic Plan : US$ 607.1 million.

Case 2 ··· Rescheduled Project (FPP and SPP) : US$ 602.7 million

Case 3 ··· Rescheduled Project (FPP) : US$ 277.8 million.

6.2.4 Calculation of Water Tariffs

Average water tariffs were obtained by the changed method as mentioned in 6.2.2 (2) including 3 alternatives of subsidies (i.e.; 0%, 50%, 100%). By such obtained Ave. Tariff, judgment can be made for deciding appropriate tariffs for enforcement and volume of subsidies. For the current weighted Ave. tariff, refer to Table 6.1 and Fig.6.1 (Part II in Main Report).

6.2.5 Operation & Maintenance cost

There are three kinds of assumed cost in principle

(1)Basic O&M cost :unit cost per m^3 of AFW

Assumed by the itemized expenditure records except depreciation per m^3 of the sold water, and applied to the first year of the construction. This cost vary depending on the volume of AFW.

(2)Electricity and Chemicals;

This cost vary depending on the operation requirement with the progress of the construction program. This cost is included in the basic O&M cost in terms of unit cost per m^3. Dynamic increase in this point is reflected on the Part of T-N.

(3)Repairs;

Upon the completion of each facility such as Kaparas intake station, WTP (Rehabilitation and Expansion), and transmission / distribution pumping station except transmission pipeline and distribution networks, 0.5% of the relevant asset value are earmarked to the addition of annual repair cost.

For further details, refer to Table 6.4, 6.5, 6.6 (Part II in Main Report).

6.2.6 Comparison of Financial Feasibility Analysis by Project

The analysis was made in two (2) different way as discussed in section 6.2.2 (1) and (2).

(1) Phase I of The Basic Plan (preliminary Evaluation);

Analysis was made as per section 6.2.2 (1) in three cases of subsidies (0%, 90%, 100%). It was proved that the revenue from the assumed water tariffs are too small on T-N side when compared with its investment cost, and resulted in "No feasibility" in Group-A. In case of Group-B, T-U get surplus by the huge subsidies of 90% and 100%. (Only in case of 0% subsidy, total balance is in the deficit and no possibility of FIRR.)

(2) Rescheduled Project (total)

Analysis was made as per Section 6.2.2 (2) in three cases of subsidies (0%, 50%, 100%).

It was proved that from the Table 6.7 and 6.8 (Part II in Main Report), only data of case No.11, 12, 17, 18 and 19 are worthy to further study in details and suggestive for guessing the appropriate percentage of subsidies. Except the case of 0% subsidies, there exist possibility of getting viability, depending on the decision of Uzbek side.

(3) Rescheduled Project (FPP only)

Analysis was made as per Section 6.2.2(2) in three cases of subsidies (0%, 50%, 100%). It was proved that from the Table 6.9 and 6.10 (Part II in Main Report) the similar cases as in above (2) are suggestive and attractive for decision making by Uzbek side. These data are summarized in Table 6.11 (Part II in Main Report) and will be most realistic figures in all.

6.2.7 Forecast and Analysis of financial statement

The analysis was made for the Rescheduled project (FPP only) with 100% subsidies as a passable selected case in order to simplify the case.

In this regard, analysis No.19 of Table 6.9 and 6.10 (Part II in Main Report) is applied basically as shown in Table 6.12, 6.13 and 6.14 (Part II in Main Report). But in order to rectify the fluctuation of the annual valance of account, Sensitive Analysis was made and the results are shown in analysis No.20, and Table 6.12(R), 6.13(R), and 6.14(R) as follows.

	Analysis No.19	Analysis No.20
(a) Income statement	Table 6.12	Table 6.12(R)
(b) Cash Flow Statement	Table 6.13	Table 6.13(R)
(c) Balance Sheet	Table 6.14	Table 6.14(R)

It should be taken into consideration that even with 100% subsidies, the fund management will not be stable according to the progress of the project, and on some later occasion, additional money borrowing and/or increase of water revenue by raising Ave. tariff should be considered in case of actual enforcement.

6.2.8 Fund Procurement

The results of the financial feasibility analysis indicate that all of the proposed projects have difficulty to be viable in case the fund management should be done by individual enterprise with its own sources of revenue. Therefore in order to improve the financial situation of the Project, the GOU should endeavor to find most favorable fund sources in the global fund market for assuring the necessary volume of subsidies.

The followings are current potential fund sources for the ROU for reference.

(a)General Loans from international lending agencies

General conditions of loan:

Interest rate	: 6~ 11% included commission fee
Average repayment period	: 10-30 years including 2-7 years grace period

(b)Soft Loan from a foreign country

Loan with soft lending conditions:

Interest rate	: Approx. 2.7%
Repayment period	: 30 Years including 10 years grace period

Besides the above foreign lending system, there is grant aid system from some countries to those classified as the Less Developed Countries (LDC) and the Least Less Developed Countries (LLDC) according to the GNP per capita. Grant aid, however, is available only for small or medium scale projects mainly for the Basic Human Need (BHN) assistance and/or in the field of technical cooperation.
Even in the case of general/soft loans, there are limitations to amount of loan as a credit line and therefore it would not be easy to obtain funds from a single agency.

6.3 Economic Feasibility Analysis

6.3.1 Introduction

In this economic analysis, an evaluation of the effectiveness of the project is made in terms of socio-economic factors not considered in the financial analysis.

Only quantifiable benefits and costs will be included in the analysis because some of them are not quantifiable or the technical methods not available to evaluate quantitatively.

6.3.2 Method of Analysis

The economic costs and benefits of the project are treated under the cash flow analysis and the discount cash flow method for the cost-benefit analysis.
The project feasibility is then determined on the obtained EIRR (Economic Internal Rate of Return).

6.3.3 General Assumptions for the Analysis

1)Project Evaluation Period:
30 years from the time of the commencement of the construction.

2)Case of the Project to be Analyzed:(Two Projects)
Case 2 : Rescheduled Project (FPP + SPP)
Case 3 : Rescheduled Project (FPP only)

3)Project cost and Benefits:
a)-Based on 1996 constant prices in US Dollars VS Uzbekistan Sums.(Unescalated)
b)-Economic benefit and economic cost are calculated based on the "with and without project principle.'
c)-Economic Costs of the Project :
The direct cost of the project should be transformed into the economic cost by adjusting the distorted portion. Construction costs and O&M costs are considered as "quantifiable cost" in this analysis.
For the calculation of O&M cost by "with and without project principle", the current norm consumption volume is used as a volume of AFW.
d)-Economic Benefits of the Project :
Benefits from increased water supply is counted as "Quantifiable benefit".
In this case, volume of AFW is based on the assumed design base which corresponds to the actual delivered water by water meter, excluding UAF.

6.3.4 Economic Cost of Project

1) The estimated construction cost is converted into the economic cost by using the system of shadow pricing to the local cost elements. (shadow exchange price factor: 0.8)

2) Construction costs of T-N and T-U are reduced to the economic cost of the net "Urban" area by the proportionate water supply volume (AFW) in 2010.

6.3.5 Economic Benefits of the Project - Refer to Table 6.17 and 6.17(R)

1)Beneficial Value of Water

a) Economic Value of net supply volume

Economic water value should be formed by the net delivered water volume without the assumed leakage and UFW as follows;

Economic Water Value:

KKP : $\frac{\text{Current Ave. Tariff (US\$ 0.130)}}{\text{1 - 0.3 (assumed leakage + UFW)}}$ = US$ 0.1857/m^3

KZ : $\frac{\text{Current Ave. Tariff (US\$ 0.083)}}{\text{1 - 0.3 (assumed leakage + UFW)}}$ = US$ 0.1186/m^3

b) Water Value of consumers, satisfaction

With the completion of Kaparas intake station, water value of each consumer group will be increased as consumers' satisfaction as follows;

- Group(1) : 4.52 sum/m^3, Ave. value of Willingness-to-pay of the consumers' survey in June, 1996.
- Group(2) & (3) : 10.55 sum/m^3, selling price of the private water producing company (Urgench transgas) as an affordability on the self-supply basis when these consumers dare to do so.

Note : water quality is considered to be inferior to that of Vodokanals, which will use the Kaparas reservoir as water source, in this case.

2)Other estimated economic benefits

Direct benefits ;

- Increase in population to be served
- Continuous supply of piped water

Indirect benefits ;

- Increase of employment opportunities
- Improvement of health conditions
- Increase in income of productive sectors
- Increase in land values

Of the quantifiable benefits to be considered in the analysis are land value and increase in income of some productive sectors besides the consumers, satisfaction.

However land value and increase in income of some productive sectors are regrettably not to be quantifiable due to lack of adequate data available.

Total economic benefits, as a whole, will be much more than the benefits included in this analysis.

6.3.6 Economic Internal Rate of Return (EIRR)

For the selected two cases (Case 2, and Case 3). The following EIRR has been obtained.
Namely;
- Case 2 (FPP + SPP): IRR 1.4%
- Case 3 (FPP only) : IRR 8.4%

As a result of sensitivity analysis for case 2, by adding assumed value of Group(2) and (3) through upgrading the water quality, the revised IRR was obtained.
Namely ;
- Case 2 (FPP + SPP) : IRR 7.8% (Sensitivity Analysis)

When compared with the difficulty of financial feasibility in section 6.2, the economic feasibility of the project in terms of the internal rate of return will be more expectative and positive as observed in this section. As a conclusion, this project is feasible from the socio-economic point of view.

6.4 Summary and Conclusion

Considering the results of Financial and Economic feasibility analysis as a whole, it will be possible to sum up the conclusion as follows;

1) Taking every possible socio-economic benefits, quantifiable and unquantifiable, into account, and considering due existence of the appropriate economic viability (EIRR) both in whole rescheduled project (case 2) and FPP (case 3), this project is considered economically feasible form the view point of total benefits of Uzbekistan.

2) As for financial feasibility, due to the limit of the tariff affordability of the consumers, it is inevitable for the GOU to provide the necessary support as a form of subsidies to the construction cost which enables to keep the balanced management of funds on the part of the water enterprises.

CHAPTER 7 ENVIRONMENTAL IMPACT ASSESSMENT

As a results of the IEE of the Basic Plan report (Part I), Environmental Impact Assessment (EIA) was implemented.

7.1 General Environmental Elements

The possible impacts of noise and vibration will not be serious and no additional restrictions are needed on the work.

Impacts of water supply facilities on landscape will be negligible since the structures to be constructed are not large and the pipelines are installed under ground.

In the study area, there are many archaeological sites as in Khiva city. Although major archaeological treasures have not been identified at the construction sites, there is a possibility of discovery of archaeological treasures underground during the construction. When digging, care will be required.

7.2 Selected Major Activities

1) Operation of Kaparas reservoir

i) Offensive odor and pollution of water in the reservoir
There is no possibility of eutrophication to occur in this reservoir since the Kaparas reservoir is not rich with nutrients and contains easily oxidized organic substances. It has been confirmed through the site survey of the Kaparas reservoir that eutrophication has not occurred at all until July 1996.

ii) Impact on river and ground water
Although the main stream flow of the Amudarya river will decrease in a summer, the drawn water volume is a quite small compared to the discharge rate of the Amudarya river and irrigation water therefore change in the environment can be neglected.

iii) Impact on other water use
It is necessary for the organizations related with the water use of the Amu Darya river to coordinate and manage rational distribution of the water in drought year.

iv) Impact on the dam

Considering the silting on the Kaparas reservoir, effect of the volume of the accumulated silts in the Kaparas reservoir is minimum since silt water of the Ruslovoye reservoir is settled down before entering the reservoir.

v) Water right

The ROU has decided to use the Kaparas reservoir as the main source of domestic and drinking water supply for the inhabitants of the Karakalpakstan and Khorezm by making the solutions.

2) Operation of water treatment plants

The components of the sludge is almost similar to those in the river sediments with Fe, which is not harmful substance forming a major part. Sludge should be treated carefully because it contains more or less heavy metals and agro-chemicals. Sludge is necessary to be dehydrated, reduced volume and disposed to the appropriate locations reserved for it.

3) Increase in sewerage water as the water supply system develops

The development of sewerage system in addition to development of water supply system is equally necessary to prevent the living and natural environment in the Study Area from deterioration. Although the MPU have a development plan for the sewerage system, the planning capacity of sewerage is necessary to be revised based on the water supply capacity of this report.

7.3 Other Minor Activities

Rehabilitation and replacement of existing facilities will generate solid waste. Although the quantity of this solid waste is small, the place or the method of disposal of the solid waste should be checked.

Construction of pipelines will obstruct traffic only temporally since most of the pipelines are located under the ground.

CHAPTER 8 CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

The total investment cost of the project proposed in the Basic Plan discussed in Part I of this Report is enormous and its financial internal rate of return (FIRR) is negative even if government subsidies fully cover the construction cost. Project evaluation thus revealed that the project proposed in the Basic Plan can not be materialized.

However, considering the pathetic condition of the population in the Study Area whose health is affected, it is considered essential to take urgent measures to implement a project to improve the quality of drinking water.

In the feasibility study discussed in Part II of the Report, in the light of the results of project evaluation, the projects in the Basic Plan were re-examined with a view of materialized the project.

First of all, a preliminary evaluation was conducted with respect to the project (Phase 1 up to year 2002) in the Basic Plan which had been originally identified for the feasibility study. It became clear from the results of this evaluation that implementation of even this part of the project is difficult.

Therefore taking the above into consideration, the project in question was rescheduled and its scale was reduced with a view point to cut down the cost which is partly to be achieved by;

1) Utilizing as far as possible the existing facilities and the equipment that are already procured.
2) Extending the treatment plant expansion program and water transmission plan by reducing the water consumption through a rational water use.

This rescheduled project was evaluated.

Evaluation of the Rescheduled Project indicated that the project needs considerable subsides from the government budget. Construction cost should be fully subsidized since the current tariff level is kept. The feasibility of the first priority project (FPP) of the total Rescheduled Project is higher than that of total Rescheduled Project.

As a result of economic evaluation, economic internal rate of returns (EIRRs) of the total Rescheduled Project and FPP are estimated as 1.4% and 8.4%, respectively. Economic viability of the total Rescheduled Project is extremely low.

From the above results, the FPP is judged as viable and feasible financially and economically.

8.2 Recommendations / Suggestions

Based on the findings of the Basic Plan Study and Feasibility Study, the project must be implemented taking the following into consideration.

(1) A decision must be taken to utilize (borrow/lease) the existing Urgench Transgas water pipeline instead of constructing a new pipeline (ø = 1,000 mm) for the 111 km stretch between Takhiatash and Kungrad.

(2) Water meters should installed for all consumers and affordable and appropriate water tariff system should be established to cover at least operation and maintenance cost. These measures will achieve effective utilization of water so that the expansion plan of water supply facilities can be cut down.

(3) The each management bodies, the Unit for Repair and Maintenance of Tuyamuyun Inter-Regional Water Pipeline or Vodokanal, are necessary to establish a sound management on a self paying basis so as to decrease the subsidies from central government. To achieve a sound management, institution, organization, operation and maintenance are to be strengthened. It is recommended to request for technical and managemental cooperation to external donors.

(4) Effective coordination among the agencies involved with the operation of Kaparas Reservoir must be established. Necessary relevant regulations and operation guidelines must be drawn.

(5) Appropriate subsides from the government budget must considered to support the DOMIWPs and keep affordable water tariff to the consumers.

(6) It would be desirable for the GOU to contact external funding agencies about the possibilities and conditions of lending for this project. In this connection it would be necessary to decide the cost component invested by owned capital of the ROU.

(7) The GOU must coordinate among the external donors concerned with this project by establishment of their policy on the water supply projects for the inhabitants in the Aral Sea Region.