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Project Name	UZBEKISTAN-DRAINAGE, IRRIGATION AND WETLANDS IMPROVEMENT PHASE-I PROJECT
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Sector	Irrigation and drainage (100%)
Project ID	P009127
Supplemental Project	
Borrower(s)	GOVERNMENT OF UZBEKISTAN
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1. Country and Sector Background

Issues in the agricultural sector and irrigation and drainage sub-sector

Due to Uzbekistan's arid, essentially desert climate, agriculture is almost totally dependent on irrigation. Irrigated agriculture is the backbone of the Uzbek economy, accounting for 35% of GDP, 60% of foreign exchange receipts, and 45% of employment. In the rural areas, irrigated agriculture and the processing of agricultural products is by far the main source of employment and incomes for the population. The most important crop is cotton which accounts for about 50% of export earnings. The irrigated areas are located in the valleys and plateaus of the Amu Darya and Syr Darya and cover about 4 million ha.

The major issues that threaten the productivity and sustainability of irrigated agriculture are. (i) the lack of farmers' incentives to improve production and productivity; (ii) low water use efficiency, (iii) shallow groundwater levels, soil salinization and lack of drainage; and (iv) the deteriorating I&D infrastructure. Huge investments are required to address these problems, the constrained investment climate in Uzbekistan is the major obstacle in resolving this issue.

Lack of farmers' incentives. The lack of incentives is a result of the de-facto continued public sector domination of the agro-industrial complex. This control has been exercised through the state-order system which dictates the cropping pattern (for cotton and wheat on approximately 50% of the total irrigated area) and the prices paid to the farms; the settlement account system, which limits farmers' access to their own financial resources; and the monopolistic input supply, agro-processing, and marketing systems, which deprive farmers of choice, raise the cost of their purchases, and lower the price of their sales.

Uzbekistan's current overall agricultural strategy is outlined in the government's "Program for Strengthening of Economic Reforms in Agriculture during 1998 – 2000", published in March 1998. The above mentioned issues are being addressed through the Bank financed Cotton Sub-Sector Improvement Project and the Rural Enterprise Support Project (RESP). Though the number of private farms has been increasing in recent years, the reforms in the agriculture sector are moving at a slow pace.

Low Water Use Efficiency. The water use efficiency in the irrigation sector is extremely low. It is often reported around 30%; in reality it is even lower. The main reasons for low water use efficiency are: (a) lack of incentives as mentioned above, (b) inadequate drainage, waterlogging and soil salinity requiring large water applications for leaching which actually turns into a vicious cycle to keep soil salinity under control, (c) deteriorated I&D infrastructure which is becoming a constraint in practicing water management; (d) poor irrigation practices due to poorly graded fields, long furrows, long intervals between irrigations and reliance on shallow groundwater levels for meeting crop water requirements; and (e) inadequate institutional capacity for proper management and O&M of the system and lack of mechanisms for water charges and cost recovery. Recent studies show that with reasonable standards of management, the water resources of Aral Sea basin are adequate to meet current irrigation requirements and provide an appropriate volume for environmental purposes in the lower reaches of the rivers and delta area.

Soil Salinization and Drainage. Shallow Groundwater levels, Drainage, and Soil Salinization. About one-third of all irrigated land in Uzbekistan has a shallow groundwater level (GWL). Waterlogged areas (having a GWL within 2 meter of the land surface) have increased by 20-30 percent over the last ten years. In Khorezm and Karakalpakstan in the Amu Darya delta, more than 80% of the irrigated area has a shallow GWL; here, in the lower reaches of the Amu Darya, potable drinking water is also in short supply. About one-third of all irrigated land in Uzbekistan is estimated to be already saline, with resulting decreases in crop yields of about 30%. The area with "highly saline" soils has increased by 27% over the same ten year period. The soils in the region had already inherent saline characteristics but the problem is exacerbated by irrigation induced salinity and the movement of salts in the basin through groundwater flow. One of the major problems is that the drainage systems are inadequate. Most of the irrigation systems developed during the soviet era in the 1960s and 1970s were constructed in haste and adequate field drainage was rarely provided. One of the consequences has been that large amounts of water for "leaching" have to be provided to keep the soil salinity down in the root zone. In fact a large part of this water is used to flush the salts from the soil surface; of this a substantial portion (often about 40% of the total amount diverted) disappears into the surface drainage system and is often misdiagnosed as an "operational" loss. In the mean time the high water table remains, the process of soil salinization continues and the leaching process has to be repeated again the next season. In addition, with unreliable and untimely water supplies, as well as the long interval between irrigations (cotton is only irrigated four times) farmers in many areas also tend to rely on the high groundwater levels for crop survival; this then becomes in fact a kind of sub-irrigation whereby water is picked-up by the crop roots from groundwater, either directly or indirectly through capillary action. The provision of adequate drainage, including field drainage, will be the only remedy to lower water tables and reduce soil salinity.

Comprehensive strategies and massive plans to tackle the severe salinity and drainage problems were made during the second half of the 80s. However, little of these plans has been implemented, because funds for the proposed works dried up after the break-up of the Soviet Union. Bank has assisted GOU in evaluating and prioritizing the various proposals for providing drainage in irrigated areas on the right bank of the Amu Darya in Kashkadarya, Bukhara and Karakalpakstan. The proposed project is the outcome of a series of studies undertaken to rationalize and prioritize the drainage interventions on the right of the Amu Draya. Under the proposed Bank assisted Drainage, Irrigation and Wetlands Improvement Phase-I Project (FY2003) selective interventions would be made to improve drainage in South Karakalpakstan in the Amu Darya delta with particular emphasis on improving water use efficiency, reducing the amount of drainage water generated, providing safe disposal of the drainage effluent, and hence improving the Amu Darya water quality downstream.

Deteriorating I&D infrastructure. From the previous section on “soil salinization and drainage” it is clear that a more efficient use of water will only be possible by providing adequate drainage and improving the water management in the irrigation system; for the latter a proper functioning infrastructure is absolutely necessary. The continuing deterioration of the I&D infrastructure is a major obstacle in improving water use efficiency. Much of the hydraulic, irrigation and drainage infrastructure was developed in the 1960s and 1970s and is reaching the end of its useful life. The deterioration has accelerated since independence due to: (a) large transfers of funds out of the agriculture sector and limited allocation of funds for O&M and rehabilitation. It is estimated that during the last five years only 40 percent of the needed funds for O&M have been allocated in the budget. About half of the actually spent budget has been used to pay for energy to pump irrigation water. Water charges are very low and are collected as part of a land tax; (b) limited institutional capacity, in planning, design and operation of I&D systems. Capacity of the design institutes, once responsible for development of water and I&D systems in Uzbekistan as well as in the whole of Central Asia, has eroded considerably and the institutes have lost most of their technical staff; and (c) there is virtually no participation of water users in the management of I&D systems.

Due to these factors the O&M of the systems is below acceptable standards and no significant rehabilitation and improvements of I&D infrastructure is taking place. Excessive water losses, low irrigation efficiencies, water logging and widespread soil salinization and declining crop yields are the consequences. The deterioration/losses of the resource base for agricultural production is estimated to cost the country about US\$1.0 billion annually in economic prices.

The basic framework for addressing the deterioration of the production base is provided by Presidential Decrees, such as the resolutions on emergency type rehabilitation, improvement of the major I&D infrastructure, water conservation, land reclamation, and the institutional framework. Early 1999, the President appointed a former Deputy Prime Minister as a full-time chairman of a new state water management inspection agency (GosVodHozNadzor), which has the authority to prepare proposals and Government resolutions for the rehabilitation and improvement of main I&D infrastructure. A first assessment by this agency resulted in a long-list of major and strategic I&D infrastructure which needs rehabilitation and improvement, such as major canals, storage reservoirs and dams, pumping stations, control and diversion structures. As a result three Government resolutions were issued to provide the framework for infrastructure rehabilitation.

Constrained Investment Climate. Despite the large needs for investments in the I&D sectors under the current macroeconomic conditions in Uzbekistan, the country’s investment capacity would continue to pose a major constraint in years to come. With macro-economic and agriculture sector

reforms the investment capacity would increase, albeit slowly. Meanwhile, a minimum level of investment is necessary to avoid the irrigation system from becoming derelict and irrigated lands turning to salt fields or desert, the reclamation of which would become impossible or require huge investments in a post reform period. The project would contribute to preventing the occurrence of an environmental and social disaster due to the deterioration of the irrigation systems. It would specifically benefit the poor population in the Karakalpakstan region. The project was therefore included in the “low case” lending scenario of the CAS.

Issues in the water resources sector

Inter-sectoral, and interstate water use conflicts. The two main rivers in Central Asia and the Aral Sea basin are the Amu Darya and Syr Darya. Most of the flows are generated in the two upstream republics. Tajikistan and the Kyrgyz Republic. During the soviet era, a large number of dams were built in these two republics for water storage in winter and spring and for release in summer, mostly to meet the demand of water for irrigation of cotton and wheat in the downstream republics of Uzbekistan, Turkmenistan and Kazakhstan. The generation of hydro-electric energy at these dams was only secondary and followed therefore largely the water release pattern in summer, most of this energy generated was also consumed downstream. The upstream republics, although rich in water and hydro-power potential are poor in fossil fuels, while the downstream countries are poor in water resources but rich in fossil fuels. During the soviet period the downstream republics therefore provided the upstream republics with their needs in fossil fuels particularly during winter when energy requirements are highest for heating. Because of the existence of a centrally managed economic system this was a relatively simple process.

After independence of the republics in 1991, this situation changed drastically. The need for exchanges of resources (water, coal and gas) remained but the resource ownership became subject to sovereignty. In 1992 the Central Asian Republic agreed to continue the interstate agreements for water (the Almaty Agreement) with the underlying premise that the storage dams would continue to be operated in the irrigation priority mode. However, for various reasons the supply of fuel and electricity to upstream republics was either reduced or delayed and often interrupted, the result being that the upstream republics changed the operation mode of the reservoirs from the irrigation mode to the power generating mode, mainly for the purpose of generating electricity for heating in winter. This resulted in substantial water releases in winter of which a large part was lost from the systems and for irrigation use, which has been affecting agricultural production, especially in the lower Syr Darya basin. The inter-sectoral water use conflicts have been a cause of uncertainty in water supply to the downstream areas and major contention on water use among the riparian states. To address these issues, various bilateral and trilateral agreements were entered into (using basically the energy trade as a proxy for water trading) but these have rarely been working satisfactorily, main reason being that the upstream republics do not have the foreign exchange to pay for the fossil fuels and downstream countries do not want to pay for water claiming riparian rights to the water of these rivers. The issues of inter-sectoral and inter-country water allocation are currently being addressed under the GEF and Bank supported Aral Sea Basin Program – Water and Environmental Management Project (WEMP).

Environmental Degradation. The environmental degradation in the region is demonstrated by the decline of Aral sea which started in 1960 due to increasing amounts of water being diverted from the rivers for irrigation. The desiccation of the Aral Sea and the damage to the river deltas has resulted in serious economic, social, human and animal health, and environmental consequences. The mismanagement of land and water resources has actually caused degradation to extend beyond the Sea to the total basin. The Uzbekistan National Environmental Action Plan completed in 1999 identified the scarcity and pollution of surface water and groundwater, the salinization and degradation of land, and the

desertification and biodiversity losses as key environmental problems in the country.

After independence, the five Aral Sea Basin countries recognized the urgency of the Aral Sea crisis and sought assistance from international donors. The Basin States have prepared a comprehensive Aral Sea Basin Program (ASBP) with the support of the international community. ASBP was conceived as a broad program comprising of 8 programs and 20 projects, and it was approved by the basin states and launched in 1994. It is currently widely recognized that the goal of restoring the Aral Sea to previous levels is not achievable in the foreseeable future. It is estimated that to restore the sea in 25 years would require 75 BCM of water annually (more than half of the combined annual flow of the Syr Darya and Amu Darya) which would be an unrealistic expectation as it would require closing most of the irrigation systems. The small scale interventions such as the one proposed under ASBP for improving the water supply in the affected areas around the sea, restoration of delta lakes, and the Northern Aral Sea can greatly help to minimize the catastrophic impact of the decline of the Aral Sea. In line with this approach, the Northern Aral Sea and the delta lakes of the Syr Darya are being rehabilitated under the Bank financed Syr Darya Control and Northern Aral Sea Phase-I Project (Ln 4609-KZ). In the Amu Darya delta the restoration of Lake Sudoche has been completed under the GEF funded WEMP, primarily using drainage effluent. Under the proposed Uzbekistan Drainage and Wetlands Phase - I Project additional wetlands would be restored using drainage water. There are several water supply projects being implemented or under preparation in both the Syr Darya and Amu Darya deltas.

2. Objectives

The main objectives of the project are to: (a) increase productivity of irrigated agriculture, employment and incomes in Karakalpakstan, one of the poorest regions in Central Asia; (b) improve the water quality of the Amu Darya river by the safe disposal of the drainage effluent, and enhance the quality of wetlands in the Amu Darya delta, and (c) development of institutions for improving water management, operation and maintenance (O&M) of the irrigation and drainage systems, and for promoting sustainable irrigated agriculture through participatory irrigation management.

Key elements of the project strategy include: (a) improving the irrigation and drainage practices in the project area, hence improving water use efficiency, and reducing the amount of drainage effluent generated and the amount of salt mobilized by the drainage water, (b) the safe disposal of drainage effluent through a drainage channel leading to the Aral Sea instead of discharging the effluent into the Amu Darya, thus improving the water quality of the Amu Darya; (c) improving the irrigation and drainage infrastructure in the South Karakalpakstan area, and (b) establishing Water Users Associations (WUAs), and promoting sustainable irrigated agriculture through participatory irrigation management, establishing a farmers' information services desk, together with crop and on-farm irrigation demonstrations and farmers' training aiming at improving current cultivation, cropping and irrigation practices. All these measures combined would increase agriculture production and increase farmers' incomes in the project area. The project would constitute the first phase of a long-term program for improving irrigation and drainage on the right Bank of Amu Darya in Uzbekistan.

3. Rationale for Bank's Involvement

The project is part of the Aral Sea Basin Program (ASBP) approved by the heads of five Central Asian States in 1994. In Uzbekistan, in particular in Amu Darya basin, the soils are saline and drainage systems are inadequate. The common practice is to apply large quantities of water for leaching the soils of salts. This practice, in the absence of adequate drainage, resembles more to washing the salts from the soil surface. It results in shallow groundwater water levels and causes, through capillary action, the salts

in the soil profile to be brought to the surface. Comprehensive strategies and massive plans to tackle the severe salinity and drainage problems were made during the second half of the 80s. However, little of these plans has been implemented, because funds for the proposed works dried up after the break-up of the Soviet Union. Bank has assisted GOU in evaluating and prioritizing the various proposals for providing drainage in irrigated areas on the right bank of the Amu Darya in Kashkadarya, Bukhara and Karakalpakstan. By improving drainage, the project would be the first meaningful intervention in the Aral Sea Basin to break this vicious cycle of high water applications, waterlogging and secondary soil salinization, hence requiring again high water applications for leaching the next season. The project would make a start in addressing this problem by substantially improving drainage conditions and significantly improving water use efficiency in the irrigation sector.

4. Description

The project is located in the Autonomous Republic of Karakalpakstan and would constitute (i) improving the safe disposal of the drainage effluent discharged from a nearly 100,000 ha irrigated area in South Karakalpakstan, (ii) the rehabilitation of the irrigation and drainage (I&D) infrastructure within this area, including the I&D systems serving the former *rovkhoze* and *kolkhoze* (FSKs) or *shirkats*, and also the I&D systems within the FSKs, (iii) the protection and enhancement of several wetlands and archaeological sites; and (iv) the establishment of water user associations (WUAs) to operate and maintain the I&D systems within the FSKs. The preparation of the next project would be supported under the project and would focus on the improvement of the drainage disposal systems in the Kashkadarya and Bukhara Vilayats. The project includes the following main components:

Component A: South Karakalpakstan Drainage Disposal System (Cost US\$52.1 million).

The drainage effluent from SK would be disposed off to the Aral Sea by connecting the existing collector drains in the area to the partially constructed South Karakalpakstan Main Collector (SKMC), which would take this effluent to the Akchadarya Main Drain (AMD), which is also partly constructed but requires completion. The major drain thus formed, namely the South Karakalpakstan Main Drain (SKMD), would be the backbone of the drainage system in SK, starting near the Amu Darya in the east and running along the northern boundary of the project area and then conveying the drainage effluent to the Aral Sea. The existing collectors connecting to the SKMD would be cleaned and rehabilitated in order for the whole drainage system to work effectively.

South Karakalpakstan Main Collector (SKMC). Works for the about 100 km long SKMC include: (a) remodeling the Beruni collector drain (CD) [21.8 km], which currently drains into the Amu Darya, in order to reverse its flow towards the Akcha Darya, thereby eliminating the need for the Beruni pumping station, (b) linking the Beruni CD with the Ayazkala CD, mostly through the existing EK-2 and Kyzylkum CDs (in total 35.4 km), which for that purpose will be enlarged, this will eliminate the need for the Kyzylkum pumping station; (c) enlarging the existing Ayazkala CD (43.5 km) up to its outfall in the Akcha Darya. The design capacity of the SKMC has been set at 25 m³/s at its junction with the AMD. SKMC flow would pass through the two existing wetlands I and II, which would be combined to develop a larger wetland. Additional works for regulating the flows to, and water levels in these wetlands may be carried out to enhance the environmental, biodiversity and social worth of these wetlands.

Akchadarya Main Drain (AMD) The AMD will connect the SKMC with the Jana Darya, an old (dry) river bed of the Syr Darya which runs to the Aral Sea. The AMD will mainly follow the existing Akcha Darya channel (an old Amu Darya river bed) over a length of about 200 km. Its construction has been partially completed over a stretch of about 40 km, starting from its junction with

the SKMC, construction has been mostly completed for the next stretch of about 80 km, while construction on the remaining 80 km up to the Jana Darya has not yet started.

Works to be carried out for the SKMC and the AMD would include channel excavation, channel protection works to prevent breaches that could damage the actively grazed rangeland or important archaeological sites; providing crossings for livestock, wetland control structures, and, the provision of hydrometric gauging stations.

Improvements to Collector Drains (CDs) Selective improvements will be made to the main and secondary CDs in South Karakalpakstan (in the Beruni, Ellikala and Turtkul Tumans) The works may include general CD cleaning, deepening where required, removal of constrictions, hydraulic and protection works at the junctions with the SKMC, and selective rehabilitation of other related canal structures

Component B: Irrigation Improvements and Command Area Development (Cost US\$15 million).

The main objective of the Irrigation and Drainage (I&D) component would be to promote sustainable irrigated agriculture in SK through rehabilitation/improvements in I&D infrastructure and technical assistance to improve reliability and efficiency of irrigation and drainage systems The component would support the following activities

- (i) **Development of Water Users Associations (WUAs) in the Beruni and Turtkul Tumans** Main features will include the development of a two-tiered system of organizations, WUGs covering a hydrological unit, and WUAs consisting of several WUGs for I&D management on the territories of the former *sovkoze* and *kolkhoze* (FSKs), that is on areas of about 1,500 to 3,000 ha. The WUAs would participate in irrigation management, in particular in water distribution, O&M of the system and collection of water charges. They would also identify and prioritize the rehabilitation works to be undertaken and participate in monitoring of their implementation,
- (ii) **TA and Training for Improving I&D and Agricultural Practices** This sub-component aims at increasing agricultural production in the project area through three main activities (a) Farmers' Participatory Training, involving training of specific target groups in various agro-technical fields and farm management; (b) demonstration of improved and modern technologies to increase production, improve water use efficiencies and reduce environmental degradation, and (c) the establishment of a Farmers' Information Services Desk in the project area to provide relevant information to farmers through different means (pamphlets, videos, radio, T V, weekly papers etc) to advise them on making their farms more productive and sensitive to emerging market demands.
- (iii) **I&D Improvements within the areas managed by the WUAs** Critical infrastructure would be improved as prioritized by the WUAs and WUGs to remove the most critical bottlenecks in the I&D systems controlled by the WUAs. The works may also include land leveling and/or the construction of additional field drains
- (iv) **Main and secondary irrigation system improvements** Selective improvements will be made to the main and secondary irrigation canals (ICs) in SK covering the Beruni, Turtkul and Ellikala Tumans. Improvements will concentrate on rehabilitation of water control structures, removing constrictions if any, canal cleaning, etc.
- (v) **Environmental Management Plan (EMP) Works** This involves the required mitigation works as

identified in the Environmental Management Plan, including but not limited to protection works for the Badai Tugai (Forest) Reserve; installation of monitoring wells for archaeological sites, costs for buffer zones along the SKMC and AMD, etc.

Component C: Monitoring and Evaluation of the Project Impact and Environmental Management Plan (Cost (US\$1.3 million).

The M&E activities are likely to cover: (i) environmental impact of construction activities in the project area in particular of the SKMC and AMD on archaeological sites, affected wetlands, population and livestock, as well as (ii) the impact of the I&D improvements in the command area on ground water levels and quality, and soil salinity; irrigation water supply and drainage flows; on-farm water use; water use efficiency at various levels; cropping patterns and yields; and livestock population, health and production; and (iii) the impact on the level of unemployment and household incomes in the project area, estimation of the project's overall benefits and economic rate of returns etc.

Component D: Project Management, Institutional Development and Training (US\$4.8 million).

This component would support the Government in implementing the project and prepare a follow-on project. It would include: (a) support for the operation of the PIU, and financing of overall project management, as well as technical assistance in such areas as detailed design, contract administration and construction supervision, procurement, financial management, and agricultural development; (b) a modest institutional strengthening program including (i) introduction of modern tools for irrigation scheduling in the project area, at the project level and at the tuman and raiselvodkhoz level, (ii) assistance with budgeting and accounting for project O&M; and (iii) training and study tours; (c) a study for improving water management in the Uzbekistan's Amu Darya river basin, the operation of key hydraulic infrastructure on the river, in particular operation of Tuyamuyun reservoir and Takhiatash barrage during extreme flood and drought periods, passing controlled floods for maintaining channel conveyance capacity and managed flooding of lands next to the river where it is desirable such as Badai Tugai forest; and (d) project preparation (feasibility studies and preparation of bidding documents) for a Phase II project possibly including development of drainage and disposal systems in the Karshi and Bukhara area. This would involve the financing of consulting services, equipment and software.

5. Financing

	Total (US\$m)
BORROWER	\$14.55
IBRD	\$35.00
IDA	\$25.00
Total Project Cost	\$74.55

6. Implementation

Project implementation is anticipated to take about five years from October 2003 to March 2009. The Ministry of Agriculture and Water Resources (MAWR) would have the overall responsibility for project implementation. The MAWR, with branches at the viloyat and tuman level, is responsible for water planning in the country and for O&M of the main I&D systems up to the boundaries of the FSKs (which have been restructured into cooperative farms (*shirkats*) and private farms). The MAWR also administers international river systems with respect to water sharing and water quality control. Within MAWR, a Deputy Minister acts as the Project Head and has overall responsibility for the project within MAWR and for liaison with other ministries and government agencies.

Responsibility for day-to-day project implementation has been delegated to the already existing PIU for the Karshi Pumping Cascade Rehabilitation Phase I Project and headed by a Technical Project Director who is supported by a small group of technical and administrative staff in Tashkent. The PIU would be assisted by national and international consultants to assist the PIU with all aspects of project management and implementation, including contract administration, management and supervision; M&E, Phase II preparation; and institutional development.

A Karakalpak Project Coordination Committee (KPCC) will be established in Nukus to supervise and coordinate project implementation. The KPCC will be chaired by the Deputy Chairman of the Council of Ministers of Karakalpakstan. Its Secretary will be the Technical Director of the PIU. Members of the KPCC will be the Hokims of concerned tumans (Beruni, Ellikala, Turtkul and Taktakupir), local representatives of the Department of Forest, Goskompriroda, and the Institute of Archaeology and Ethnography, as well as two farmers' representatives of each tuman.

Project Operation and Maintenance. The following organizations are currently responsible for the management and O&M of the different parts of the I&D infrastructure in the project area.

- (a) The Karakalpakstan Ministry of Agriculture and Water Resources, responsible for the major inter-district irrigation canals
- (b) The District Level Irrigation Organizations (*Raionvodkhoz*), responsible for the I&D networks up to the boundaries of the Former State and Collective Farms (FSKs)
- (c) The Hydro-Amelioration Expedition, responsible for the O&M of the inter-farm drainage network up to the boundaries of the FSKs, and
- (d) The water management organizations responsible for O&M within the boundaries of the FSKs

7. Sustainability

The main infrastructure to be constructed under the project, particularly the SKMD is of a "public good" nature and funding of its O&M is therefore expected from the government budget. The O&M of the main I&D infrastructure within the command area has so far been financed by government, although at levels that have been insufficient for good maintenance. The O&M of the system needs to be improved. However, even under similar conditions of O&M, the sustainability of irrigated agriculture under the project would improve because a poorly maintained gravity based drainage system would perform much better than the current pumping based system. It is expected that upon completion of the project the WUAs will pay for at least a part of the water services provided by the Tuman water management organization (*raiselvodkhoz*). The members of the WUAs will also be required to pay for O&M of the I&D infrastructure managed by the WUAs. Under Component B, TA will be provided to establish, develop and assist the WUAs in the carrying out of their tasks.

8. Lessons learned from past operations in the country/sector

Experience from ongoing project implementation in Uzbekistan and other Central Asian Countries suggests that:

- (i) organizational arrangement should take into account the difficulty of coordination among key government agencies;
- (ii) competent and efficient national management staff is necessary and should be recruited before

- project effectiveness;
- (iii) timely provision of adequate counterpart funding is essential;
- (iv) there should be appropriate technical assistance, which, if not recruited in time, can jeopardize effective implementation,
- (v) rigorous economic and environmental criteria should be applied in project planning and design,
- (vi) there should be major emphasis on procurement, financial management and construction quality control, and
- (vii) the importance of involving local institutions in project design and preparation.

Therefore, special attention needs to be paid to strengthen the implementation capacity of the MAWR agencies involved in project implementation. The design of the proposed project has incorporated these lessons.

9. Environment Aspects (including any public consultation)

Issues :

The project is aimed at reversing the environmental degradation caused due to inadequate drainage, and mismanagement of land and water resources and hence has overall positive environmental impact. The project itself is in fact an environmental management/mitigation program for controlling the waterlogging and salinity, improving the quality of the Amu Darya water, and wetlands and biodiversity in the Amu Darya Delta area. It is placed in Environmental Category "A" due to the major construction activities it will support and the changes it may have on land and water management. The environmental assessment process also provides a mechanism for rigorous review of the proposed actions and for public consultation as part of the decision making process to ensure that it would be subjected to a rigorous environmental assessment and analysis in view of its location in a zone of considerable ecological interest –though at present greatly degraded

The environmental assessment (EA) preparation was undertaken by an international consulting team financed by EU-TACIS. The team has worked closely in association with the PIU and its consultants for project preparation and design. The main stakeholders have been identified and consulted. Consultations were held with central and vilayat level government and academic institutions (including the Forest Department, the national and Karakalpakstan environmental agencies (Goskompriroda), and the Institute of Archaeology and Ethnology) and NGOs, as well as with Tuman and local levels formal and informal leaders and with potentially affected communities and families. This effort has resulted in a brief scoping report of environmental and social concerns as well as preferences raised by the stakeholders. These interactions contributed to the baseline survey report that was used as the basis for the environment impact assessment and environmental management plan (EMP).

The most significant issues are: (a) the protection of archaeological sites; (b) the issues related to Lake Ayazkala, the wetlands in the Akcha Darya river channel and the protection of the herders' rights in the Akcha Darya valley and delta; and (c) the protection of the Badai Tugai (forest). The DIWIP-I may potentially have certain negative environmental impacts but it is expected that these can all be fully mitigated. The measures proposed for mitigating various affects would in fact enhance the environment and generate positive impacts. The main objective of the project is to improve the drainage conditions in the project command area, which is expected to considerably reduce waterlogging and soil salinization. As a result the overall environmental impact of the project would be very positive.

Archaeological sites The Akcha Darya is an old riverbed and functioned as such till about 100 BC. There are numerous historical sites along the old riverbed and in the delta of the Akcha Darya. These

sites include citadels and castles that are typically 20 centuries old. Overall, the project is expected to have a positive effect on archaeological sites as the lowering of the ground water table should reduce the risk of deterioration of these sites. Nevertheless, water table monitoring sites have been set up in areas where these monuments are within 150 meters of the SKMD. If instead the water table would be found to rise, mitigation measures such as lowering the ground water table by pumping or lining of the SKMD near the site to be protected could be implemented.

Ancient nomadic and semi-nomadic tribes used the river valley, and remnants of settlements are probably located on both sides of the river bed. The collector drain is cutting through the riverbed and could occasionally touch upon such sites. The northern delta also contains a number of settlements such as the Barakram oasis and the Kurgashin kala. However, little is known about this area, which is partly blown over with sand dunes.

To assure that the permanent or temporary project activities will not disturb these sites, the following actions are envisaged or are being implemented during project implementation:

- (a) a system of groundwater monitoring in selected wells near cultural heritage sites has been set-up (in October 2002). Additional wells if required would be established prior to starting construction of the surface drains. The groundwater levels, in particular near the cultural heritage sites would be monitored by the independent Monitoring and Evaluation (M&E) consultants team reporting directly to the Government of Karakalpakstan,
- (b) the planned location of the proposed collector drain is shared with the Cultural Heritage consultant. The proposed alignment has also been marked on the ground. The Cultural Heritage Consultant team has done a field survey along the alignment and assessed that the proposed alignment would not pose a risk to the preservation of cultural heritage sites,
- (c) The independent M&E consultants would also have a Cultural Heritage team which would continue the independent monitoring during the project implementation. It will also assist in handling any "chance-finds" during the construction phase. The procedure for the "chance find" will be specified in the bidding documents for construction works. The Cultural Heritage Consultants would establish contacts with relevant institutions in the country to preserve and/or store any "chance find" item of cultural importance.

Lake Ayazkala This is an artificial lake of 6,000 ha that receives drainage water from the Kyzylkum PS. See Annex 11 for detailed description of this lake and discussions regarding mitigation measures.

Four main alternatives for dealing with the lake have been considered: (i) keeping the lake "as is" i.e. maintaining both western and eastern parts of the lake, (ii) improving western part of the lake through flushing and hence improving overall quality of the whole lake, (iii) closing the whole lake both western and eastern parts, in which case mitigating measures would have to be designed, and (iv) closing only the western part and improving the eastern part. This option is most suitable on economic and environmental grounds and has been selected for implementation. Further details on each option and reasons for rejections are given below.

Keeping the lake "as is" does not make any sense both on environmental and/or economic grounds. The western part of the lake is dead for all practical purposes and has little value for the ecosystem. The salts have been dumped in this part over twenty years, they have concentrated and settled on the bed of the lake. Keeping "as is" would mean additional evaporation and concentration of the salts in western part of the lake and continued deterioration of quality of the lake.

Improving the quality of western part of the lake is infeasible both on economic and environmental grounds. Improving the quality of the lake would require heavy flushing annually through the lake on a sustained basis. The water available for flushing is the drainage water with expected salt concentration of 4 g/l which can be supplied either by installing a new pump station on the western end of the lake, or construction of a conveyance channel from the existing Kzylkum pumping station passing through the lake to the western end. The capital and O&M cost of pumping makes this option economically unviable and unsustainable.

In addition, it is extremely difficult to improve the quality of the western part of the lake and also flushing this part of the lake would cause environmental damage to the eastern part of the lake which is relatively fresh and the downstream channels and grazing areas. The lake is very shallow with high surface area to volume ratio and hence ratio of annual evaporation to lake volume is very high making it extremely difficult to maintain desirable water quality in the lake in particular because available inflows for flushing the lake consists of drainage water with concentration around 4 g/l. Annual water supply equal to about four or five times the annual evaporation i.e. around 200 million cubic meters is required to bring down the lake concentration to 5 g/l in 7 years and maintain at that level thereafter. This excessive volume of water is not available in the system. With the limited volume of the lake and high surface area it is indeed a desert sink for depositing salts moved by drainage water (or a salt dump) as it intended to be in the original design and truly not a lake. Hence, its restoration is not justified. Furthermore, huge quantity of salt mobilized from the western part, accumulated over a period of more than 20 years, and additional salts deposited due to evaporation all of which has to move through the eastern part of the lake would damage the eastern lake and also the channels downstream in particular the Akchadarya route. Hence, flushing the western part of the lake is more damaging to the environment than closing it properly.

Government also realizes that closing the lake immediately in its entirety is not feasible at this time as the eastern part is still valuable for bird life, although of relatively little value for fisheries. Government has therefore selected a somewhat revised version of the third option. The western part would be separated from the eastern part by the construction of a low dike on the ridge between the two parts. This would allow the western part to dry out and it would be closed properly. Some of the pumps of the Kzylkum PS would be kept in operation, thus maintaining and providing a flow of water through the eastern part, where water quality is then expected to improve. During the project implementation period the migration and breeding of birds as well as the fisheries in the eastern part of the lake will be closely observed and monitored. Government expects that most of the birds will migrate to the new wetlands I and II (the Kurgashinkala wetlands) that will be created in the SKMC and Akchadarya Main Drain (AMD), as well as the envisaged new Wetlands III in the AMD. Additional wetlands may develop on the old bed of Aral Sea. The wetlands would be managed using the model developed by Karakalpakstan Government under the Lake Sudoche restoration project (funded under WEMP) and Lake Musdrach. The drainage water is the primary source for these lakes, however, fresh water is passed from the canal system when it is available. The improvement in the quality of existing and new wetlands would be monitored by the independent M&E consultants reporting to the Karakalpakstan Government. If such improvement is adequate the government also plans to slowly close the eastern part; if this is not the case, the eastern part would be maintained. The State Committee of Nature Protection (Goskompriroda) would be informed about the results of the environmental monitoring on annual bases. MAWR would consult Goskompriroda and the Bank before deciding to close the eastern part of the lake. If eastern part of the lake is to be kept then the sufficient pumping capacity in the Kzylkum pumping station would be rehabilitated under the project in order to provide reliable flow to the lake at least over the next decade.

It should be noted that under Uzbekistan's current precarious economic conditions, the financial sustainability of pumping drainage for the purpose of maintaining an artificial lake is highly unlikely,

especially for a lake that has little economic value. A properly guided and planned partial or full closure of the lake is therefore a much safer option than keeping the lake without a pumped water supply, which would then dry out, causing environmental problems for the adjacent lands and the population dependent on it. Also, the drainage water contains various chemicals and without adequate flushing the concentration would increase (as happened also in the eastern part during the two years of drought recently) making the lake a hazard. The initial closure of the western part of the lake over the project period should include measures like growing suitable trees and plants on the dry lake bed in area where salinity levels are relatively low, plowing and turning over the soil where surface salinity is somewhat higher and covering the surface with soil where surface salinity is extremely high. The cost of such works have been included in the project and they would be carried out as part of the contract for construction of the main drain. At the start of the project's implementation various experiments would be conducted to find the most cost effective ways to close the western part properly. The same methods would apply in case at a later date the decision would be taken to close the eastern part as well.

Wetlands in the Akcha Darya Valley and Deltán 1998, a portion of the flood waters released from Tuyamuyun reservoir were intentionally routed through the project area's irrigation and drainage system and through the Akcha Darya channel, in the absence of a drain connecting to the Aral Sea this led to the flooding of rangelands and considerable complaints from the local population, especially the livestock herders. It has been agreed with MAWR that the AMD would be designed in such a way that flooding of the rangelands will not occur again. Firstly, under the project the construction would begin from the Aral Sea side and AMD completion would move towards the south i.e. from downstream to upstream towards the irrigated area so that any discharges released to the drainage collectors can be passed without flooding the adjacent lands. The construction contract would be designed to carry out construction in this manner. Secondly, starting from south of Chukurkak to the Jana Darya a confined channel would be constructed capable of fully containing the AMD's design discharges. The local herders' wishes with respect to increasing the number of livestock crossings would be considered on the basis of current tracts and migration routes. A list of crossings required, in particular on the stretch of drain south of Chukurkak, has been prepared. In addition, the construction contract would be provided with sufficient contingency funds for providing additional crossings if such need arises during the construction. The impact of seepage from the AMD on the environment (habitat and wells) will be evaluated. Some support for selected monitoring of disease and disease vectors will be provided and, where needed, a plan to reduce their short and long term effects through water canalization and a strengthening of the animal health service (and vaccination).

The Badai Tugai (forest) reserve is a 6,460 ha nature reserve (*zapovednik*) and one of the few remaining tugai forests along the right bank of the Amu-Darya, in the Beruni and Kegelli districts. The reserve was created for the purpose of saving tugai woods and fauna under conditions of regulated river discharges. It has a unique biotope and contains a fairly unique fauna, including a herd of about 40-100 elk that migrate in and out of the forest. In the course of the development of irrigation along the Amu Darya over the last 50 years the water regime in the floodplain has changed significantly. The regular floods of the river are now largely controlled and the water supply for the forest is now mainly from ground water, partly fed by the river and partly from the Beruni collector Drain (CD). The Badai floodplain is also occasionally fed with water pumped from the river. The groundwater has reportedly become more saline, and there are signs of salinity stress among certain trees (mainly *Populus ariana*). The drainage water pumped by the Beruni station on one hand increases the soil and groundwater salinity the Badai Tugai area and hence it is damaging for the forest, however, on the other hand in the absence of reliable supply of fresh water to the area serves as source of water supply even though its quality is bad. The proposed reversal of the flow in the Beruni CD and provision of better drainage in the area would help in soil and groundwater salinity and would be beneficial for the forest. However, supply of fresh water is necessary in order to save this remaining forest reserve and develop it properly. Therefore, the objective of the mitigation

measures is to develop means for supplying this area with the fresh water

The MAWR is willing and prepared to invest in improving Badai Tugai since its ownership and responsibility for its management lies with MAWR. The protection of the forest would require: (a) maintaining a certain water table, with reasonable inflow of fresh water for the survival of the existing forest; and (b) occasional flooding (as a minimum once every 4-5 years but ideally annually) to induce sprouting of seed and rejuvenation of the forest. A number of options have been reviewed and discussed with interested parties in stakeholder meetings, among others: (i) pumping from the Amu Darya; (ii) re-opening the old upstream channel of the Kok Darya and connecting it to the Amu Darya, (iii) supplying the Kok Darya from an irrigation canal near the boundary of the reserve; (iv) rehabilitating the Beruni PS to continue the supply of drainage water to the Kok Darya). Subject to preliminary surveys, designs and cost/benefit comparisons, the technically best option appears to be the re-opening of the old upstream channel of the Kok Darya and connecting it to the Amu Darya, as well as providing an irrigation pumping station on the bank of the Kok Darya to pump water for a few weeks each year to facilitate seed germination. In addition, an existing irrigation channel would be extended and connected to the Kok Darya through which any extra water in the irrigation system would escape at the same time supplying water to the forest. This solution would improve the groundwater levels and groundwater quality, and provide fresh irrigation water. In this way, the closure of the Beruni PS would not only be mitigated but the quality of the forest would actually be enhanced considerably under the project. The works required for improving the Badi Tugai water supply would be included in the construction contract for the main drain SKMD. The Amu Darya water management study that would be carried out under the project would suggest improvements in the management and operation of the river, in particular of Tuyamuyun reservoir, Takiatash barrage and river reaches downstream, including flood management in these sections of the river and ways of passing controlled floods to maintain the carrying capacity of the river and create controlled flooding along the river. This would offer an alternative to providing an irrigation pumping station for Badai Tugai

Consultations

The project, in particular the AMD was conceptualized during late eighties. It is under implementation since 1992 and a substantial part of the AMD works have already been carried out. Consequently, the population in the area and various stakeholders are well aware of the project. However, following Bank guidelines on consultation and disclosure, the EA/Social Assessment and the engineering consultants as well as PIU and MAWR undertook extensive discussions in the project area with all stakeholders. Most of the consultations with NGOs and civil society organizations were undertaken during project preparation as part of the SA efforts. The intent of developing this project and a brief project description has been shared as early as in 2001 with the general public in local newspapers and through the distribution of two types of leaflets (i.e. with different levels of complexity) in three languages summarizing the potential environmental and social impact. The main stakeholders were identified and consulted. Consultations were held with oblast level government, academic institutions and NGOs, with formal and informal leaders at raion and village level, as well as with potentially affected communities and families. This effort resulted in a brief scoping report of environmental and social concerns and preferences raised by the stakeholders. These interactions contributed to the baseline survey report that has been used as the basis for the preparation of the environment impact assessment and environmental management plan. During the Bank's pre-appraisal of the project the project scope was more clearly defined, and appropriate solutions to the various environmental and social issues identified, the EA and SA reports would be revised, and scoping sessions and consultations with the stakeholders and NGOs in the project area carried out during November/December 2002. The consultation meetings were held in Ellikala, Beruni, Turtkul, Takhtakupir, Tumans and in Nukus. The meetings were also held in Tashkent and with Goskompriroda in Nukus as well in Tashkent. The project scope and summary was distributed

to the participants prior to the meeting in Russian. In these meeting the main discussions were related to the development of the drainage system by gravity instead of current arrangement of disposal of drainage effluent through pumping which all participants found ineffective and development of water users' associations for improving irrigation management and water use efficiency in the project area and hence reducing the generation of drainage water. Other issues discussed were measures related to improvement of Badai Tugai forest reserve, and Lake Ayzakala. The participants of the meetings in Beruni and Ellikala were interested in these two issues, while the alignment of the drain was of interest to the participants of Takhtakupir. The participants agreed to the proposals for mitigating any potential negative affects of the project incorporated in the EMP. The final EA study report and its Executive summary report, in English and Russian, will be placed in the World Bank InfoShop, made available at the World Bank office in Uzbekistan and will be widely disseminated within Uzbekistan

The EA and SA team has also been interviewed by local newspapers in each district, which published articles describing the project. The head of Goskompriroda for Ellikala district took part in filming a five-minute news report about the project with the consultation team, which was shown on Karakalpakstan television on November 23, 2000. On November 24, 2000, the group organized a round table for interested NGOs and other parties which was filmed by regional and national television.

10. List of factual technical documents:

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Note: This is information on an evolving project. Certain components may not be necessarily included in the final project.

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