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Rural Development

Provision of Technical Assistance to the Tajik Ministry of Land Reclamation and Water Resources and the Water & Energy Council to further develop the National Water Sector Strategy and an Irrigation Sub-sector and Implementation and Investment Plan

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APPENDIX B: IMPLEMENTATION AND INVESTMENT PLAN FOR THE IRRIGATION AND RURAL WATER SUPPLY SUB SECTOR

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INTRODUCTION

This implementation plan proposes steps to be completed before a deadline or during a certain period. The implementation steps are followed by an investment estimate for each of the steps; these investment estimates are based on assumptions that are discussed in the main text or listed in supporting footnotes. Worksheets were developed for most calculations done; these worksheets were handed over in electronic form to the MoLRWR for further detailing of the assumptions and specification of the required investments. The report contains a follow up/monitoring table detailing the goals and achievements for the various steps identified and providing a summary of the estimated investment costs.

The basic roadmap was provided in a tabulated form to the MoLRWR in November 2011 and agreed to in general terms. However further discussion of the concepts has only been ad hoc and with mid-level management of the MoLRWR. Lastly various steps were only addressed in the last moments because the exact process of the reforms in the irrigation and drainage sub sector were not agreed on the highest governmental levels. Therefore the implementation plan should be reviewed in detail by the MoLRWR and adapted on a priority basis during the first year of the reforms (2012). In general an implementation plan like the one provided is a working document and needs at least annual review and updates.

1. IMPLEMENTATION OF WATER SECTOR REFORMS

The present implementation plan is a follow-up of the first plan from June 2011. It provides more details on various steps in the reforms' process and some indications of the required investments in the irrigation sub-sector. The transition of the Ministry of Land Reclamation and Water Resources (MoLRWR) to a Ministry of Integrated Water Resources (MIWR) is included as well. The plan is closely related to a proposed reforms' roadmap that was prepared by the end of November 2011 and follows the same steps. The road map consists of eleven elements, six of which deal with preparatory steps, four are concerned with the actual implementation and one refers to the routine functioning of IWRM in River Basins.

Although it may seem that there is an in-balance between preparatory work and implementation this is not the case. The preparation lays the foundation for the reforms and to obtain good results significant changes are required in the water management, the underlying legal procedures and the institutional structure. There is also a need for extensive training and non-training capacity building and awareness-raising, which will promote ownership for various stakeholders.

1.1. PRINCIPLES OF IWRM

The reforms are based on the principles of integrated water resources management. These principles were largely agreed on in an agreement between the Minister of Land reclamation and Water Resources and various donors in April 2011. The agreement included:

1. Using river basins as the management area;
2. Separation of tasks between policy and regulatory tasks for the Ministry of Land Reclamation and Water Resources and its Basin Organisations or Agencies and operational tasks for the Water User Associations, the to be created MIROB and possible other service oriented organisations;
3. Application of IWRM principles;
4. The recognition that donor support is required in order to successfully complete the reforms.

On basis of these agreements a number of regulations were developed mainly focusing on the separation of tasks with a focus on the creation of an irrigation and drainage water service delivery agency, the MIROB.

Although the reforms are generally in line with the Dublin principles of 1992 and point 3 of the April 2011 agreement mentions the principle of IWRM, a few aspects are missing and the concepts are not always clear to all parties involved.

In the following paragraphs some of the principles are further discussed, additional ones proposed and suggestions are provided for their introduction and general application under the conditions of Tajikistan.

1.1.1. River basin management areas

The first principle of using river basins as basic management areas is in line with the Dublin principles and allows for the planning of water resources and their use by different sub-sectors on a logical basis. It forms a natural basis for distribution of water over various sub-sectors and allows the effect of water usage on the water quality to be taken into account and its subsequent regulation through standards. By following river basin boundaries the effects of various sectors on each other are logically taken into account as well. In practice there are three issues that need further consideration:

1) It is essential to establish basin organisations from the start, since the new management areas require planning on the basis of basin boundaries as well as regulation and control of water distribution and water quality issues and negotiations between users at the basin level. This cannot be done effectively from the national offices. A large office will

not be required since tasks involve facilitation, control and regulation, however some medium to high level personnel and basic office facilities are required;

2) Sub basin offices are needed from the very beginning of the process due to the design of the basins. The present proposal for basins has a number of sub basins included; this requires generally the establishment of basin and sub-basin offices at once.
    a. The most challenging basin is the Syr Darya Basin, which combines the Zarafshan and Syr Darya basins into one basin and two sub-basins. This is geographically logical due to the mountain ridge separating these two Northern sub basins from the Southern part of the country; it is also convenient because the basin would follow the existing boundaries of the Sughd Oblast. Due to this choice however, it is essential that the sub-basin offices are established immediately since the Zarafshan sub-basin is hydrologically and geographically separate from the Syr Darya (Sub) basin and drains towards the Amu Darya.
    b. Another example where a sub-basin organisation is essential is the Qaratogh sub-basin, which is included in the Ghissar Basin. However the Qaratogh sub basin is geographically and hydrologically separate from the main Ghissar Basin and drains through the Surkahndarya through Uzbekistan into the Amu Darya;
    c. For the Kafernigan Sub-basin and the Murghob Sub-basin, sub-basin offices are less of a priority issue since they form sub divisions of the Vakhsh and Ghissar Basins in the same main flow area;

3) Allow a mixture of hydrological and hydraulic boundaries. The River Basins as major management areas are on basis of a hydrological boundary; this is also the case for many of the sub basins and, (micro) catchments that can be distinguished. However for specific systems, hydraulic boundaries form the management unit as the natural flow is diverted and transported through specific channels, whether ditches or pipes.

1.1.2. Separation of functions

Another pillar of the reforms is the separation of functions. This is an essential part of the reforms as it aims to avoid conflicts of interests between the policy and regulatory level, acting in the common interest, and the operator with a more localised interests. Separation of functions also promotes efficiency. Although the separation of functions was agreed on in April 2011, it is only partially being implemented. This is partially due to confusion of the tasks of various institutions/organisations/agencies in the water sector as well as with the terminology. It is important to re-emphasise that IWRM and also the separation of functions does not work on the basis of a standardised universally applicable approach. This allows the process to be well adapted to local conditions and customs, but makes it more difficult to implement and requires regular adaptations.

The main principle of the separation of tasks is that policy and regulatory functions are separated from the operational functions. In general the main policy setting, legal proposals and regulations development take place at national level, while the operations take place at local level. The policy and regulatory function also includes water resource management functions such as determination of safe yields or abstraction rates as well as the permitting on a basis of such safe yields and permitting water quality of effluents in order to maintain water quality at an acceptable level. These functions are best carried out at the basin level, since safe yields of water, seasonal water availability as well as actual water quality as influenced by return flows is defined by the local (basin or sub-basin) conditions not by the national conditions. Therefore there is a need for a (sub) basin level water resources management institute, which can be called River (Sub) Basin Agency, River (Sub) Basin Organisation or River (Sub) Basin Water Resources Management Institute, but does plan, regulate and control issues in the common interest at the River (Sub) Basin Level. In line with the principle of management at the lowest appropriate level **this is most efficiently done at the (Sub) Basin and not at national level**.

1.2. IMPLEMENTATION PLAN

During the last months, the ideas of how to gradually introduce the reforms have changed various times. Principles and practical actions for the reforms remain largely the same, irrespective of the exact route of the transition phase. Therefore a tabulated implementation plan has been made for which most details and assumptions can be found in the main text. Some technical details for certain steps are provided in the main text as well.

2. IMPLEMENTATION PLAN MONITORING TABLE

																		01 February 2012	
Implementation plan timing and benchmarks = ⊙	2011	2012				2013				2014		2015	2016	2017	2018	2019	2020	Progress (green, on schedule, yellow behind, not critical, red critically behind schedule)	Estimated costs[1] US$
	Achieved	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	S1	S2								
1. Define strategic goals																			
1.1 Investments in Pumped Irrigation		→	→	→	⊙													TA proposal provided;MoLRWR to take decision	10,000
1.1.1 Conduct Socio Economic Study in pumped areas			→	⊙														Study proposed	150,000
1.2 Implementation of the "User (polluter) pays Principle"		⊙																TA proposal provided; MoLRWR to take decision	5,000
1.3 Criteria for Asset (Management) Transfer determined		⊙																Not started	40,000
2. Economics, tariff setting and debt																			
2.1 Determine Financial Goals		⊙																Ongoing	5,000
2.2 Analyse costs		⊙																Started with inventory	5,000
2.3 Define strategy against future debt accumulation		⊙																Awaiting decision by MoLRWR	10,000

[1] *The costs for components 1-6 mainly refer to TA required. Additional costs for MoLRWR and other organizations internally are not included*

																		01 February 2012	
Implementation plan timing and benchmarks = ⊙	2011	2012				2013				2014		2015	2016	2017	2018	2019	2020	Progress (green, on schedule, yellow behind, not critical, red critically behind schedule)	Estimated costs[1] US$
	Achieved	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	S1	S2								
2.4 Define a debt recovery strategy		→	→	→	⊙													TA proposal provided	10,000
2.5 Adapt financial arrangements to new structure					⊙													Not yet started due to discussions on reforms concept	20,000
2.6 New financial structure fully operational												⊙							150,000
3. **Further develop Organisational Structure**																			
3.1 Develop structure and staffing of MoLRWR including RBOs		⊙																Largely proposed in resolutions, details to be finalized	10,000
3.2 Transformation of MoLRWR into MIWR		→	→	→	→	→	→	→	→	→	→	⊙						Start made by resolutions for MoLRWR	150,000
3.3 Develop structure and staffing of MIROB at national level			⊙															Proposal made by TA, further development needed	10,000
3.3 Develop Structure of Basin and Scheme MIROBs in general, and in particular for at least 1 (Sub) Basin			⊙															Proposal made by TAs further work needed	10,000
3.4 Adapt MIROB Structure for other Sub Basins								⊙											
4. **Finalise Legal Requirements**																			
4.1 Review and finalise Water Code for submission					⊙													Started	20,000

																		01 February 2012	
Implementation plan timing and benchmarks = ⊙	2011	2012				2013				2014		2015	2016	2017	2018	2019	2020	Progress (green, on schedule, yellow behind, not critical, red critically behind schedule)	Estimated costs[1] US$
	Achieved	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	S1	S2								
to Parliament																			
4.2 Review and finalise Water User Associations Law for submission to Parliament					⊙													Started	5,000
4.3 Review all other related laws and propose changes									⊙									To start in 2012	40,000
4.4 All major codes and laws in line with IWRM in Basins										⊙								On basis of 4.3	50,000
4.5 Review other decrees, regulations and resolutions												⊙						Ongoing, MoLRWR and MIROB decree and resolutions developed	60,000
5. Develop Database and other tools																			
5.1 Asset Inventory database			⊙															Proposal made by TA, development needed	20,000
5.2 Asset Management database				⊙														On basis of 5.1	10,000
5.3 Institutional Development database				⊙															10,000
5.4 Flow modeling and monitoring						⊙												In coordination with hydromet projects	40,000
5.5 Fee collection and revenue flows database							⊙											Start in 2012 finalise on basis of 5.4	40,000
6. Transition of MoLRWR to MIWR																			

																		01 February 2012	
Implementation plan timing and benchmarks = ⊙	2011	2012				2013				2014		2015	2016	2017	2018	2019	2020	Progress (green, on schedule, yellow behind, not critical, red critically behind schedule)	Estimated costs[1] US$
	Achieved	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	S1	S2								
6.1 Creation of the IWRM working group for strategy review	✓																	Completed	5,000
6.2 Regular meetings of IWRM working groups	✓	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙								Ongoing	1,000
6.3 Strategy finalized					⊙													Ongoing	25,000
6.4 Development of new function descriptions for departments of the MIWR, including organogrammes, job descriptions and staffing plan, for start of implementation in 2013.					⊙													Ongoing, if required new regulations should be developed (and decrees)	25,000
6.5 Elaboration of an Implementation and Investment Plan			⊙															Prepared by TA, discussions delayed	25,000
6.6 Regular meetings of National (Energy and) Water Council		✓		⊙		⊙		⊙		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	First meeting conducted	10,000
6.7 Further development on regulations of basin management, determination of hydrological boundaries and the definition of functions to be continued under MIWR			⊙															Decree and regulations prepared, hydrological boundaries being introduced	15,000
6.8 Change management in MoLRWR			→	→	→	→	→	→	→	→	→	⊙						To start March 2012	800,000
6.9 Adapt budgeting to Mid Term Expenditure Framework Approach			→	→	→	→	→	→	→	→	→	⊙						Ongoing?	

																		01 February 2012	
Implementation plan timing and benchmarks = ⊙	2011	2012				2013				2014		2015	2016	2017	2018	2019	2020	Progress (green, on schedule, yellow behind, not critical, red critically behind schedule)	Estimated costs[1] US$
	Achieved	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	S1	S2								
6.10 Ongoing M&E, Planning, Human Resources Development and Career path planning												→					⊙	Assumed to start in 2015	320,000
7. Implementation of basin management																			
7.1 Capacity building plan at basin level developed				⊙														Not started	5,000
7.2 Establish 5 basin RBO offices			⊙															To start after March 2012	1,000
7.3 Water allocation plans per basin			⊙															On basis of existing procedures	1,500
7.4 Establish monitoring system, link to database and test in pilot basin				→		⊙												To start in April 2012	10,000
7.5 Capacity building				→		→					→	⊙						To start in March 2012	2,100,000
7.6 Roll out monitoring system												⊙						To start in 2013	15,000
7.7 Establish River Basin Council											⊙							To start Sept. 2012	288,000
7.8 Support to creation of WUAs (outsourced to NGOs but supported and regulated by Basin Organisations)												⊙						Ongoing, but more of a lead-roll from 2013	10,192,000
7.9Start pilot participatory planning in 1 (sub) basin							→	→		⊙									100,000
7.10 Roll out participatory planning to other basins (gradually)										→	→	→	⊙						150,000
7.11 Continued Human																	⊙	To start in 2015	130,000

																		01 February 2012	
Implementation plan timing and benchmarks = ⊙	2011	2012				2013				2014		2015	2016	2017	2018	2019	2020	Progress (green, on schedule, yellow behind, not critical, red critically behind schedule)	Estimated costs[1] US$
	Achieved	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	S1	S2								
Resources and Career Development																			
8. Implement MIROB																			
8.1 Establish MIROB in 5 basins and sub basins			⊙															Depending on the final decision by GoT	7,000
8.2 Develop Scheme MIROBs in one or two pilot (sub) basin (s)				⊙														Depending on the final decision by GoT	50,000
8.3 Enter in contract with WUAs, FWUAs			⊙															WUA law needed (see 4.2)	50,000
8.4 Transfer assets to the developed Scheme MIROBs and to WUAs where WUAs exist, only to Scheme MIROBs in absence of WUAs2					⊙													No system developed yet (see 1.3)	300,000
8.5 Transfer assets to WUAs, FWUAs					⊙													No system developed yet (see 1.3)	130,000
8.6 Establish monitoring system and start monitoring functioning				⊙														Could be developed in conjunction with database	100,000
8.7a Start Capacity building programme (training and materials and equipment)				⊙														No plan yet	29,920,000
8.7b Capacity building finalised																	⊙		With above

[2] *According to system/criteria as agreed (section 3.3)*

																		01 February 2012	
Implementation plan timing and benchmarks = ⊙	2011	2012				2013				2014		2015	2016	2017	2018	2019	2020	Progress (green, on schedule, yellow behind, not critical, red critically behind schedule)	Estimated costs[1] US$
	Achieved	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	S1	S2								
8.8 Document the monitoring results and analyse						⊙												Dependent on developing the monitoring system	250,000
8.9 Evaluate and adapt						⊙													125,000
8.10 Roll out (steps 8.2 to 8.6) to two other basins						→	→	→	→	⊙								Simultaneous 2 basins	1,274,000
8.11 Rollout to other two basins										→	⊙	⊙						Each basin one year later	1,274,000
8.12 Routine functioning, organisational development and monitoring, evaluation and planning												→	→	→	→	→	⊙		
9. Rehabilitation and improvement of infrastructure																			
9.1 Finalise and analyse inventory and asset management system				→	→	⊙												Inventory to be structured and preferably based on database	
9.2 Identify actors and beneficiaries in the pilot basin				⊙														Simultaneous with database development	
9.3 Identify priorities for rehabilitation					⊙														
9.4 Start rehabilitation in the pilot (sub) basin (assuming Vakhsh Basin)						⊙													213,000,000
9.5 Roll out to other basins (each in two years)										⊙			⊙		⊙		⊙		668,000,000

Table 1: Implementation plan components, benchmarks, progress and estimated costs

3. DEFINE (ADDITIONAL) STRATEGIC GOALS

The first step is to define the additional strategic goals of the reforms apart from the IWRM, River basin management and separation of tasks that were agreed on the 7th of April 2011. These additional goals are mainly related to financial capability and objectives.

3.1. INVESTMENT IN PUMPED IRRIGATION

Almost 50% of the irrigated area in Tajikistan is irrigated through pumps, which pump water from the rivers to higher elevations. The systems, often referred to as cascades, are characterised by some of the highest pumping elevations in the world. Pumps used often have a high to very high capacity and energy consumption. For example the pumped system of Zafarabod requires at full capacity 80 MW of power[3] for an area of 30,000 ha with about 15,000 families directly or indirectly dependent on it.

The pumps are relatively difficult to maintain, requiring specialised personnel. The costs of operation are very high as compared to gravity systems, due to the energy required for pumping and the relatively high frequency maintenance required combined with the specialised operation and maintenance personnel needed.

The pumped systems suffer almost everywhere in the country from degradation. Plans for extensive rehabilitation have been developed by various organisations including the staff of various water supply companies for pumped systems. The rehabilitation of the pumped systems is generally high, ranging from almost 2,000 US$/ha for a partial rehabilitation of Garauti to 1,000 US$/ha for the Zafarabod system where some of the capital costs have already been invested[4].

The main problem of the pumped systems however, is not the investment cost, but the operational costs. These operational costs are a multitude of the initial investment costs due to the large energy consumption. Even at the low prices of electricity existing in Tajikistan this leads to high annual operational costs progressively increasing with the height of the lift. A World Bank study from 2003 shows that with lifts higher than 60 m and using an energy price of 0.02 US$/Kwh, more than **60% of the lands will produce a negative margin**. For Zafarabod this percentage is even 95%. The study in Garauti conducted in 2010 shows operational costs of 4 to 7 million US$/year for an area of 12,000 Ha using an energy price of 0.04US$/KWh[5].

Although the energy costs for farming are subsidized and lower than economic prices, it has been difficult to recover energy costs from the farming community. This leads to tremendous costs for the GoT to provide irrigation water especially at high elevations and is not affordable for the country on the long term. Therefore a choice has to be made how to reduce these costs. Three options are suggested:

1) **Business as usual**: leave the system in its present state; only spend money for routine operation and maintenance. This will result in low efficiencies of the irrigation water and a gradually collapsing system;
2) **Partial Rehabilitation**: determine a maximum height, rehabilitate systems to this height and invest in social and technical systems that improve the efficiency.
    a. Socially Federations of Water User Associations can play an important role in systems operation at the canal level and improved on-farm water management;
    b. Technically the efficiency of the conveyance system can be increased and different crops, irrigation and cultivation techniques could be introduced. This will lead to higher production for the same unit of water and energy and exclude the areas with the lowest efficiency;
    c. Energy costs should be gradually increased to match economic costs and cost recovery improved;

[3] *A power consumption of 80MW is comparable to a medium sized town with about 80,000 households!*
[4] *These are the only systems for which relatively detailed feasibility studies have been carried out*
[5] *Comparable to the domestic energy tariff*

d. The rehabilitation should be accompanied by a livelihoods strategy to improve off-farm and non-farm income generation; this should also include other Natural resources Management options such as (fruit) tree development, (controlled) grazing.
e. For higher areas pilots should be carried out with drip irrigation and fruit tree establishment.

3) **Abandon:** Stop providing subsidized electricity and governmental support to the irrigation cascades. Allow WUAs and individual farmers to invest in the system if they desire, this might lead to incidental systems to continue to function. Where WUAs and farmers will not be able to keep the system running introduce social programs for alternative income generation, natural resources management, and ultimately re-allocation.

3.1.1. Conduct Socio-Economic Studies in areas served by Pump Irrigation

The assumed poverty of the local population is one of the main arguments to keep investing in loss making pumped irrigation systems, which puts a burden on the national budget. In order to support decision making, better information is needed in order to identify these poverty levels, livelihoods and dependence on irrigated agriculture and a study is recommended in the pumped areas. Such a study should be carried out by an independent institute. It should determine poverty indicators as a function of the height of pumping, determine dependency on irrigation water, and identify alternative strategies for livelihoods already applied as well as those that could potentially be developed. These potential livelihood strategies should include natural resources management, small and medium business development, and possibly the potential for water efficient irrigation systems like drip irrigation for higher elevations.

3.2. IMPLEMENTATION OF THE "USER AND POLLUTER PAY" PRINCIPLES

Social, environmental and financial sustainability of the system is one of the main objectives of the water sector reforms. The social and environmental sustainability are addressed through the IWRM in River Basins' approach, which is based on recognition of the environment as a water user and the need for public participation in planning implementation and management. A major strategic decision still has to be taken on the financial sustainability and how to achieve this.

On the long term the principle of ***"the producer/consumer pays"*** is recommended. Likewise ***"the polluter pays"*** principle is recommended for the water quality.

3.3. CRITERIA FOR ASSET TRANSFER TO MIROB AND WUAS AND THEIR FEDERATIONS

Due to the separation of tasks, operation and maintenance of irrigation and drinking water schemes will no longer be a task for the MoLRWR. Therefore criteria have to be agreed on the asset transfer to the National MIROB, Basin MIROB, Scheme MIROB, Federations of WUAs and WUAs.

3.3.1. National MIROB

It is recommended that the national MIROB will not have any direct O&M tasks, only a guidance and monitoring task.

3.3.2. Basin MIROB

The Basin MIROB will be in charge of O&M of large structures such as dams, weirs, tunnels from dams and maintenance (not operation) of the largest pumps, say above 1 MW.

3.3.3. Scheme MIROB

In the presence of WUAs in the scheme, the Scheme MIROB is responsible for the river infrastructure for water diversions, for pump houses feeding into the main canals and for large primary canals (above a command area of a certain size, for example 5,000 Ha). The WUAs are

responsible for the secondary canals on which they are formed. If a federation exists, it will take care of the O&M of the main canals with a command area less than 5,000 Ha. In certain cases the federation of WUAs might take care of larger systems as well in agreement with the scheme MIROB. In the absence of a Federation the WUAs will take care of the O&M of the secondary canals and its infrastructure (possibly of the off-take as well)

Where no WUAs are present yet, the Scheme MIROB will take care of the O&M of the entire system; however the formation of WUAs and Federations of WUAs will be encouraged and actively pursued.

3.3.4. Federation of WUAs

Are service oriented organizations that combine a number of WUAs in a scheme and have as objective to enter in contractual agreement with the MIROB on water delivery, supply water to the WUAs in agreed quantities and against agreed fees, maintain the infrastructure of the water supply system feeding into the WUAs and play a role in conflict resolution between WUAs if needed. They will be in charge of the O&M of main canals and the division structures and offtakes to WUA areas and of main canals in larger pumped systems as well as smaller pump stations in these systems. WUA federations are regulated by the WUA law.

3.3.5. WUAs

WUAs are service oriented organizations for their members which enter in contract with the scheme MIROB in case of absence of a Federation of WUAs, or with the Federation of WUAs. They are in control of all infrastructures within their area. This refers to all infrastructures from offtake to drain outlet in gravity systems and secondary canals or smaller primary canals (e.g. below 500 ha) of pumped systems as well as farm pumps. WUAs are regulated by the WUA law.

3.3.6. Asset transfer

It is recommended that all assets for the Basin MIROB are transferred to the Basin MIROB immediately after its establishment. For the Scheme MIROB and WUAs this should be done after the infrastructure location and status of the first pilot basin(s) have been appropriately entered in the database. For each handing-over an asset transfer list is prepared that clearly indicates the type and condition of the infrastructure as well as a commitment to rehabilitate or improve in case this is needed.

4. ECONOMICS, TARIFF SETTING AND DEBT

Financial sustainability depends largely on the agreed systems to be applied that need to be structured, transparent and clearly identifying end goals.

4.1. DETERMINE GOAL

An agreement is required on the goal of the cost recovery and tariff.

4.1.1. Final cost recovery goal

An exact long term goal needs to be set. This should take into consideration the principle of the "user pays" as well as the value that agriculture represents for society. If for example it can be justified that on the long term the average citizen of Tajikistan has a certain benefit from irrigated agriculture then a certain percentage of the cost recovery might take place through the federal budget (i.e. the taxpayers). Such a benefit could be in the form of better food security, increased purchasing power of the rural population, development of processing industries, stable or increasing exports (important for foreign currency) and other positive feedback to business.

For example on the basis of an assumed average benefit of 20% to the national interest, a goal of 80% total cost recovery in 20 years could be set.

4.1.2. Cross subsidies

Another choice that has to be made is that of cross subsidy. The question that needs to be answered is: do the better-off people need to pay a higher price for the service than cost recovery for their system in order to support the worse-off people who are dependent on systems with higher cost? In principle we recommend against this practice[6].

If, however, it is decided that gravity systems pay a slightly higher price in order to support pumped systems this needs to be clearly identified and approval for this strategy should ideally be obtained from the stakeholder platforms.

4.2. ANALYSE COSTS

In order to set intermediate goals for cost recovery through fees it is necessary to analyse costs for different systems, such gravity systems, pumped systems with different heights, and drinking water systems. The costs should be separated into categories:

a. Operation costs;
b. Maintenance costs;
c. Depreciation (reserve funds for future investments needed).

Goals should now be set for the time period in which these categories can be reached e.g. operational costs to be fully covered in 2 years, maintenance costs to be covered in 5 years and O&M and 80% of the depreciation costs to be covered in 20 years.

Operational costs

Operational costs correspond to the group of costs that bear a direct relation to the volume of water of water supplied like energy, operation labour. These costs should be covered by the user as soon as possible. The reasons for having these costs covered by the user are that:
1) if costs are not covered, then the supply will discontinue to operate,
2) the subsidy of operation costs does not stimulate an efficient use of the scarce resources like energy[7] and water,

[6] *It is also in contradiction of the "user pays" principle.*
[7] *A UNDP indicates that the price of electricity is unnaturally low compared to the prices of natural gas and liquid fossil fuels and over the medium and long term, electricity prices should be increased to provide funding for the maintenance of the power system and the construction of new production facilities.*

3) direct subsidy of commodities[8] benefits mostly those that handle large quantities of these commodities, the large farmers, the farmers at the beginning of a system, the traders, not the poor farmers[9],
4) subsidy for an export crop like cotton means subsidy for a consumer living in another country.

Maintenance costs
Maintenance costs bear a more indirect relation to the volume of water supplied but if maintenance costs are not properly covered this will cause a system to stop functioning within a few years. That is why users should pay within a short term (5 years) a delivery fee that will allow the coverage of these costs. Especially in irrigation where much of the maintenance can be done by the user himself; a policy that encourages this has high priority. The provision of water directly to WUAs or a WUA Federation divides maintenance costs between (public) provider and the private users. The maintenance cost of the provider will decrease, which will also decrease its water delivery price. The maintenance cost of private users might also decrease due to the use of more labour.

Depreciation costs
Depreciation costs bear an indirect relation to the volume of water supplied. The depreciation costs form a relatively large part of the total cost. On an annual base they provide a source of cash that can be used either as a reservation for a replacement/rebuilding of a new system or, to cover the financial debt obligations made to invest in the system. A fee policy should aim at covering most of depreciation in the long run; as suggested 80% after 20 years because it can be assumed that improved water-supply infrastructure will have a positive effect on production level and incomes and consequently on tax collection.

4.2.1. Example of Water Delivery Fee (tariff setting)

Due to a lack of insight in the exact build up of the costs and expenditure of the MoLRWR and the required payment for external services (such as energy costs and required investments for infrastructure) this example is mainly based on assumptions, but may be refined once better information becomes available. A summary is shown in Table 2.

Operational costs
For the operational costs, let us assume that presently 80% of the annual budget of the MoLRWR is required for operation. Assuming an annual budget of TJS 30 Million, this means that annually TJS 24M is used for operations. The irrigated area amounts 743,640 Ha. Assuming that each hectare receives an average of 10,000 m^3 this means that 7.4 billion m^3 of water is used. Per m^3 of water delivery, this would equal to 0.33 Dirham. The current tariff set by the antimonopoly agency of 1.5 Dh/m^3 easily covers this amount. **Note that this does not include the electricity charges for pumping**.

Using an economic energy price (9 Dh/KWh), the area irrigated by pumps (277,421 Ha), an average lift of 50m, and an efficiency of 31%[10], the operational costs for the pumped area would amount 3.95 Dh/m^3 and the average operational cost per m^3 of delivered water would be 1.8 Dh/m^3.

Maintenance costs
Assuming an average investment cost of 1,000 US$/ha for gravity irrigation and 2,000 US$/ha for pumped irrigation and the generally adopted 2% annual maintenance costs, the average

[8] The argument to keep direct costs low to help poor farmers is probably not accurate. Helping poor households is more efficiently done through direct social cash transfers than by making water cheap. Water of which most is lost before it reaches the crops and that helps large and well positioned users most.
[9] The argument that the poor people will move elsewhere might be true but this is not to be seen as a threat but as a positive development. Elsewhere in the world urban populations are increasing as the importance of the agricultural sector declines and that of the industry and service sectors are increasing. It is in these sectors where they will find employment and a better income.
[10] Taken from the Zafarabod pumps

maintenance costs would be 1.32 Dh/m^3. For gravity systems the maintenance costs would be 1.00 Dh/m^3 and for pumped systems 1.92 Dh/m^3.

Depreciation costs
Using the same assumptions as above and the generally adopted 5% annual depreciation for larger investments, the average depreciation costs would amount 3.3 Dh/m^3. For gravity systems the depreciation would amount 2.4 Dh/m^3 and for Pumped systems 4.8 Dh/m^3.

Table 2: Summary of breakdown of water service delivery fees

	Gravity (Dh/m^3)	**Pumped (Dh/m^3)**	**Average (Dh/m^3)**
Operation	0.33	3.95	1.8
Maintenance	1.00	1.92	1.32
Depreciation	2.40	4.80	3.30
Total	**3.73**	**10.67**	**6.42**

Table 2 clearly indicates that under the assumptions used, the current tariff does not completely cover the average operational costs of the irrigation water delivery services (83% of the average operational costs is covered). This means that the costs directly related to the water delivery are not completely covered.

However, for gravity systems the tariff covers full operation and maintenance and even a fraction (7%) of the depreciation costs. For pumped areas, the tariff only covers less than 40% of the operational costs. This is a clear example of cross subsidy in which the gravity irrigated areas subsidise the pump irrigated areas. As mentioned earlier cross-subsidy as a general principle is not recommended.

On basis of the service delivery fee breakdown, an analysis of the proposed cost recovery targets can be done. The target for phase 1 is operational cost recovery in 2 years, phase 2 includes maintenance cost recovery after 7 years and phase 3 adds 80% recovery of depreciation costs after 20 years. The targets are largely met by the present service delivery fee of 1.5 Dh/m^3 for gravity systems. O&M are fully covered and an annual increase of 0.1 Dh/m^3 would result in 80% depreciation coverage in 20 years. For the pumped systems cost recovery is much further from target. To reach full recovery of phase 1, an annual increase of 1.3 Dh/m^3 would be required. This would be followed by a more moderate increase over the next 5 years of 0.4 Dh/m^3 to reach the phase 2 and phase 3 targets. Possibly a more even development of the service delivery fee should be considered and an annual increase of slightly more than 0.4 Dh/m^3 could be applied for the next 20 years. This would result in reaching phase 1 only after 6 years and should be considered a subsidy.

4.3. DEFINE STRATEGY AGAINST FUTURE DEBT ACCUMULATION.

The majority of the debt is accumulated in pumped irrigation systems; the actual debtor is often difficult to define as there is not always a well maintained administration of fee payments. Therefore a strategy should include:

- Set up a transparent and easily accessible registration of fee payments;
- A clear commitment to gradually increase the price for water delivery until cost recovery with clearly identified timelines;
- Installation of water meters to measure volumes of water delivered in between WUAs;
- Phasing out of cross subsidies from the energy sector[11], by applying equal energy rates for all uses, for example phasing out in 5 years;
- Introduction of the possibility to stop water supply in case of non-payment;

[11] *Or the Republic of Tajikistan at large*

- An awareness campaign to inform and explain this policy to the farmer. In newspapers, through interviews, on radio, television, and in seminars.

The final strategy should be finalised by December 2012.

4.4. DEFINE A DEBT RECOVERY STRATEGY.

The debt recovery strategy should be based on 3 principles.

a) A clear insight needs to be provided in the debts in terms of location (scheme) and amounts and reason (e.g. illegal pumping);
b) The reforms in the water sector have as an important objective, to create an economically viable sector in which the user pays for the water service delivery. Therefore an incentive might be given to those persons who have formed water user associations and started collecting the next year's fees by pardoning a certain percentage of outstanding debts. Percentages and steps have to be defined;
c) Develop a gradual debt recovery schedule on scheme basis for all the schemes; the scheme MIROB can use this for debt recovery on basis of a percentage price increase per m^3 delivered or KWh spent for pumping. The time limit could be set at 5 years, i.e. March 2017;
d) Identify after 5 years which are bad debts and include them in following year's budget in order to avoid a chain of debt accumulation and repay Barqi Tajik.

4.5. ADAPT FINANCIAL ARRANGEMENTS

Presently financing for the practical activities at sub-national level is partially routed through the local governments. An annual budget, earmarked for irrigation and land reclamation is provided to the Oblast from where it is subdivided to the Rayons. The budget is determined based on estimates from three sources, national, provincial and district offices and distributed partially in the same convoluted way (the consultants were never provided detailed insight in the money flows and processes and more accurate details cannot be provided). With the creation of the MIROB and split of the operational and policy, organisational and regulatory functions, money flows will be redefined and made more structured. On the operational side, a clear relation between (quality of) services and fees should be aimed at.

5. FURTHER DEVELOP ORGANISATIONAL STRUCTURE

Once the general strategic goals and financial principles have been identified, there will be an ongoing development of the organisational structure. This has to some extent an iterative character typical of a “learning organisation”.

The general process to be followed is:

- The structure should be developed on basis of a mission analysis of the main organisation;
- function analysis that leads to fulfilment of this mission and identifies the required units;
- The functional units should provide an indication of the required departments;
- A task analysis should be performed in the departments;
- On basis of the tasks the required staff and their job descriptions should be identified.

The criterion for recruitment of personnel should be on basis of merit based open applications and selection procedures for the staff positions. However due consideration is to be given to the personnel already working in the MoLRWR and their transfer to new positions. Given the high level of competence of the MoLRWR personnel it is quite likely that both processes will easily merge.
The following elements will need to be developed, regularly reviewed, adapted and further aligned with the changes in the system and the general philosophy of the water sector reforms in general and the irrigation and drainage sub sector reforms in particular.

1. Develop structure and staffing of MoLRWR including RBOs in line with the general process given above.
2. Turn the MoLRWR into a MIWR. This includes slowly absorbing more regulatory tasks in various sub-sectors that are not fully regulated yet and clear specification of the coordination tasks of the MIWR for sub-sectors where regulatory frameworks do exist. The MIWR should also obtain the authority to bring the regulatory framework of the sub-sectors in line with each other or to propose such amendments to the National Water (and Energy) Council.
3. Develop structure and staffing of MIROB at national level in line with the general process given above;
4. Develop Structure of Basin and Scheme MIROBs for 1 (Sub) Basin in line with the general process given above;
5. Adapt MIROB Structure for other Sub-basins in line with the general process given above.

6. FINALISE LEGAL DOCUMENTS

These are ongoing activities that need to be followed up and some seem to require more focus from the MoLRWR. Critical issues are:
The water code should have clear reference to IWRM and River basin management. The descriptions should remain enabling (as is the case at present), thereby not going into too much detail, but leaving details to be filled in through resolutions and decrees.

a) It should be clearly stated in the code that management on water resources is on basis of hydrological management areas, not administrative;
b) There should be a description of the River Basin Council, which should be exclusively reserved for a multi-sector users' (interest-decision making) organisation. Preferably it should not be a mix of government organizations and users;
c) A cross-ministerial Water Council or Water and Energy Council and its role in promoting IWRM should be clearly identified;
d) There should also be a clear role for the local government as a monitor/assurance that local groups receive what they are entitled too, but not as a local decision maker on water issues.

The water code has been amended various times since it was first promulgated in 2000. An amendment proposal developed by the parliamentarian committee on natural resources management was submitted to the parliament and the law was amended accordingly. The exact changes to the water code are not clear, but on basis of a quick review of the proposal it is likely that considerable additional changes are needed. Therefore it is highly recommended to perform an in depth analysis of the water law within an IWRM context. Since this analysis is preferably conducted jointly with other ministries and agencies in the water sector during the coming months, the IWRM WG seems to be the best platform. On the basis of this review a more comprehensive proposal for amendments of the water code, entirely in the line with the ongoing reforms can be prepared.

The water user association law also needs a number of amendments in order to fully facilitate Water User Associations and to be in line with the reforms.
The water user association law should clearly identify:

a) Hydrological areas as management areas for WUAs and Federations of WUAs;
b) The obligation of all water users in the WUA area, whether member or not, to abide by the WUA rules and pay fees to and through the WUA;

Other laws related to water and natural resources development need to be reviewed as well. Some specifics are listed below. This listing is far from complete and a full scale analysis of all related laws including the constitution are needed in order to propose necessary amendments to bring the full legal framework consistent with the long term IWRM goals. This process is expected to take at least 2 years to be fully finalised.

c) For the drinking water law joint analysis of the law should be carried out within the framework of the Inter Ministerial Coordination Council for drinking water and sanitation (IMCC);
d) MoLRWR should participate actively in the land code and dekhan farm law groups;
e) Analysis of all decrees and resolutions related to Water and Natural Resources Management in its broadest context.

7. DATABASE DEVELOPMENT

A database structure is required to better streamline the activities of the ministry, the financially independent but related agencies and associations. The database could serve for asset inventory, linked asset management and required investments as well as in order to support the reforms and streamline processes like fee collection, annual budgeting, and human resources development. A general structure for an inventory database was presented to the ministry by the TA team. It requires further development, testing and adaptation.

7.1. INVENTORY ASSESSMENT METHOD RECOMMENDED

1] Instead of a table/spreadsheet collection method, it is preferable to have a record wise/database data recording and storage method. This means a database file for each of the asset categories: one for pump houses, one for pumps, one for canals, one for structures and one rural water supply systems.

2] In the vertical review of the ministry dated 18.02.2011, one issue identified is that the exchange between oblast and rayon water departments and the ministry is not adequately automated. The inventory assessment should be automated making water basin authorities in charge for the collection and updating of such inventory database that is to be linked through internet at national level.

3] Each record in these databases should contain the following fields with:

- A specific asset-scheme code[12]. This is a A-B-S-I-N code with five bits of information A(river-basin Authority)-B(Basin)-S(scheme)-I(Infrastructure type)-N(a numeric number).
- Date of recording
- Person who collected the data
- Person who has checked the data
- Location's longitude and latitude, easy to be collected by means of GPS, Google Earth©, etc.
- The code of the inflow structure where it receives water from.

4] The inventory should contain more physical and financial specific data that determine the cost of rehabilitation than just the one current field. These specifications are to be divided into units and unit-prices for buildings, pumps, machinery and labour. This is because of the following: a) this makes the assessment more transparent; b) some donors do not finance labour costs; c) depreciation time of machinery is shorter than of buildings and their refinancing reinvestments can be considered in the financing plan; d) for items like machineries that have to be imported, a foreign reserve funds is a part of an investment plan.

5] In the canal records, the "Volume Rehabilitation" should be based on measurements of cubic meter at three or five different and specified spots in the canal; in the beginning, the end, the middle and in between points of the canal. The record should also provide information on the canal type (earthen, brick/stone lined, concrete lined or canalette).

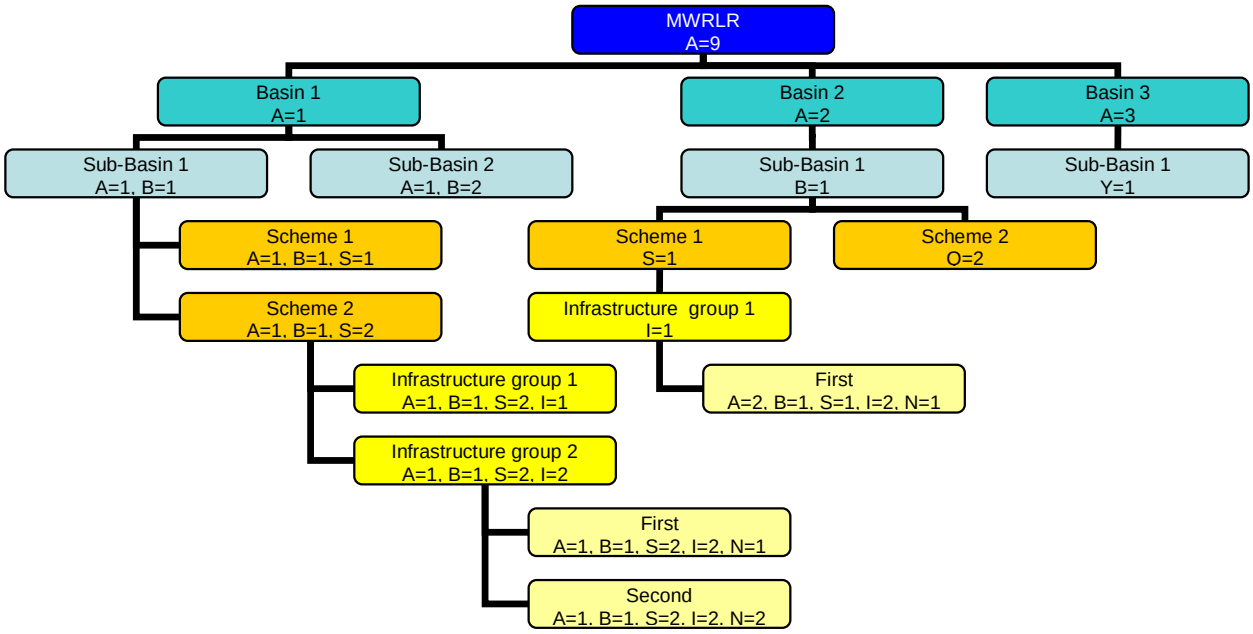
6] The inventory database should be extended with separate databases that contain information on area irrigated, number of households served, number of beneficiaries, institutional requirements in terms of physical investments, and staff development and training needs. This will make monitoring and evaluation on effectiveness and efficiency possible[13].

The structure of that water sector asset information system is shown in Figure 1 with the proposed coding.

[12] *For further information is referred to the chapter on this subject*

[13] *E.g. number of Beneficiaries/investment cost/watershed, area/investment cost/watershed. Beneficiaries/ha, ha/pump, etc.*

Figure 1: Schematic overview of proposed database and its codes



7.2. PHASING THE INVENTORY, INVESTMENT NEEDS ASSESSMENT AND REQUIRED INVESTMENTS FOR DATABASE.

From above, one can conclude that for a sector wise investment inventory is needed before for an investment plan. This requires the development of a reliable and transparent investment inventory information tool. Putting in place such an information tool includes different activities which should be carried in a phased manner.

The following stepwise approach to this was proposed to arrive at a common understanding of what needed to be done and to have an agreement and inputs on the time required for each step. However, insufficient time could be spent on discussion and agreement of the stepwise plan with the MoLRWR team.

Step	Time weeks	Activity	Result	Inputs	Costs (US$)
1	3	Agree on investigation database method	Agreement on method between parties.	Staff, TA	20,000
2	2	Development testing of Inventory data collection, entry and tabulation method in one basin.	The database method developed checked and running, people trained in collection and data entry	Staff, transport, TA	20,000
3	2	Collection of all data in one basin	A complete inventory record set of one basin	Staff, TA	20,000
4	1	Training staff in record collection and data entry	30 persons exposed and trained in data collection and recording	Staff, TA	35,000
5	3	Collection of all data in other basins	A complete inventory record set of all basins	Staff, transport, TA (1 week)	155,000
6	1	Drafting plan of inventory of investments needed including those for setting up basin Authority's infrastructure and	An nation-wide list of required investments	Staff, TA	5,500

		trainings. X offices, one in each of the riverbasin main centres. Each office provided with 2 PCs and 1 internet connection to make the data gathering and information provision an online interactive system. Transport facilities, 2 cars and 4 motor bikes, to make regular visits to schemes and WUAs possible. 2 pieces of GPS measuring equipment; Training courses in use of new equipment, planning, IWRM Maintenance equipment and tools.			
7	1	Online linking of basin records into one system	A nation-wide inventory information system	TA	5,000
8	2	Development of methods for other data collection like on hectares cropped, farmers billed, farmers paid, crops planted and asset management	A basin monitoring information system.	TA	10,000
9	10	A pilot of such data collection method, data entry check and tabulation method in one or more schemes.		Staff, transport, per diems TA (2 weeks)	120,000
10	1	Training staff in data collection and entry of other data	20 persons exposed and trained in data collection and recording	Staff, TA	25,000
11	2	Data collection and entry of other data in other basins	A nation-wide water basin monitoring information system.	Staff, per diems TA (1 week)	105,000
12	2	Data analysis and development with ministry staff of an indicator set on effectiveness and efficiency.		Staff TA (1 week)	7,000
13	4	Formulating priorities based on indicators on efficiency and effectiveness	A nation-wide phased investment plan based on priorities of effectiveness and efficiency; putting the required investments in the different schemes on a time path, based on clear priorities and available budget sources.	Staff, TA (2 weeks)	14,000
TOTAL DATABASE DEVELOPMENT					541,500

Finally, considering that Tajikistan is part of the large Aral Sea Basin, such a national information system by adding a country code in front of the X-Y-Q-W-Z could in the future become an international Aral Basin information tool.

7.3. CODING

A systematic method for identifying rehabilitation needs and monitoring the operation of the assets in an electronic manner is the coding of the many kinds of components that form the water sector.
That is why we have presented the following coding method for this.

We recommend that the MWRLR introduces the following coding to make it possible indentifying the different pieces of infrastructure in the Water Sector. The coding system distinguishes five bits of information and the A-B-S-I-N system is proposed for the following reasons:
A, stands for **A**uthority, i.e. the river-basin authority
This is a one digit number for each of the five main river-basin authorities (1 = Badakhshon, 2 = Panj, 3 = Vakhsh, 4 = Ghissar, 5 = Syr Darya) and "9" for non river basin authority at national level such as a training centre for integrated water management for instance.

B stands for **B**asins: it has two digits, one for each of the 66 sub-basins authorities (camats?) and digits between 90 and 99 for non sub-basin specific infrastructure linked the river-basin authority head quarter.

S stands for **Scheme**: (1) for a gravity irrigation scheme; (2) for pumped irrigation; (3) for Rural Water Supply scheme[14]
S has one digit and 4, 5, 6, can be used for other such as dam-structures etc.

The A, B and S codes indicate the location of and authority over the infrastructure.

I stands for the kind of **I**nfrastructure within a specific scheme (ABS): a canal (I=1), distribution structure (I=2), drainage structure (I=3), pump-house (I=4), main water meter (I=5) with a specific number for each of the different types[15]. In addition a special I code could be added for information on the service or water supply system (area irrigated, households or/and people served etc.).

N is a multi-digit **N**umber between 01 and 99 for the number of infrastructures (ABSI) of the same category in a specific scheme. 99 would be used for a non-Scheme specific item like, for instance, a scheme or water-supply office.

The database allows people to distinguish between different infrastructure types and to group data on the basis of different criteria for pre-defined queries. For each infrastructure, a field sheet needs to be filled out clearly indicating the data of data collection, the coordinates of the structure and name and function of the person carrying out the data collection.

This coding format A-B-S is to be used to register in a Scheme specific database, data like year of construction, coordinates of the intake, coordinates of outlets, land size, soil type, soil structure, elevation, slope, number of farmers/customers served, number of WUAs served, number of dekhan farms served and distance to the next hardened road. A-B-S coding method is also useful in assisting developing WUAs (and eventually denkan farms), to store in different WUA databases WUA specific fixed data like data of establishment, number of farm plots, WUA command area, address, name, number of different structures under the responsibility of the WUA etc. In addition such a system could be extended in future with a WUA database using the same coding, that allows entering regular records with variable data like area of the five main crops grown, volume of water provided to the area cultivated with the five main crops grown, date of recording, water fee charged, fee collected, WUA members, maintenance cost and performance of supported WUAs.

In future the A-B-S system could be expanded to other countries in view of the establishment of a Central Asian Basin System, by putting a C-code (for Country) in front.

7.4. WORKSHEETS FOR DATA COLLECTION

[14] *In future other entities might be included like an urban water supply system or an energy producing dam.*
[15] *This is to be determined*

During a meeting at the MoLRWR the database data collection and storage method could be explained in details. On request of the MoLRWR field data collection sheets to accompany the database were developed as well.

7.5. INTRODUCTION

The following paragraphs introduce some of the proposed worksheets and field sheets that could be used for data collection. They are not an end-product but included as a reference to provide a basis for further development of a database.

7.5.1. Pump houses

DATA ENTRY Worksheet for PUMPHOUSE

I standard

DATATYPE	**Fill in**	**DATATYPE**	**Fill in**	**DATATYPE**	**Fill in**
Code ABSIN		Date Collection		Date Entry	
Name data collector		Name person responsible		Year of construction	
ABSIN Inlet		Total installed capacity (m)		Book value	
No of pumps		Northing		Easting	

In use? Yes/No
Ownership? State/WUA/Other, specify:

Pipes

Number	Length	Diameter	Material	To be replaced (m)
1				
2				

Pump Inventory

Pump	Type[16]	Lift (m)	Capacity Kw	Pump-efficiency (%)	Discharge (lps)	Year	Book value	Replacement Value
1								
2								
3								
4								
5								
6								

Pump Status

Pump	In operation Yes/NO	Actual maintenance TJS/year??	Energy use KWH/Y	Operation Hours	Leakage %	Electric system Year installed
1						
2						
3						
4						
5						
6						

[16] *1= Centrifugal, 2= piston, 3= Impeller*

Rehabilitation costs

Category	**Unit**	**# of Units**	**Value**
Buildings			
Labour	Days		
Material	M3		
Machinery	Days		
Pumps			
Labour	Days		
Material	KG		
Machinery	Days		
Electric Equipment			
Labour	Days		
Material	Parts		
Pipes			
Labour	Days		
Material	M		
Machinery	Days		

7.5.2. Canals

DRAFT DATA ENTRY WORKSHEET FOR CANALS (I = 02)

I Standard

DATATYPE	Fill in	DATATYPE	Fill in	DATATYPE	Fill in
Code ABSIN		Date Collection		Date Entry	
Name data collector		Name person responsible			
ABSIN Inlet		Length (m)		Book value	
CANAL type[17]					

In use? Yes/No
Ownership? State/WUA

II Dimensions

	EASTING	NORTHING	Bed-Width (m)	Silt-depth (m)
Begin point				
End point				
Mid point				
Q1 point				
Q3 point				

III Damage (number)

Category	Section 1	Section 2	Section 3	Section 4
Leakage points				
Breaches				
Bank damage				

IV Rehabilitation

Category	Unit	# of Units	Value
Labour	Days		
Material	M3		

[17] *1= earthen, 2= concrete lined, 3= masonry lined, 4= canalettes, 5=others*

Machinery	days		
Fuel	Liter		

7.5.3. Structures

DATA ENTRY WORKSHEET FOR STRUCTURES

I standard

DATATYPE	**Fill in**	**DATATYPE**	**Fill in**	**DATATYPE**	**Fill in**
Code ABSIN		Date Collection		Date Entry	
Name data collector		Name person responsible		Year of construction	
ABSIN Inlet		ABSIN outlet		Book value	
Function[18]		Northing		Easting	
Design discharge m^3/sec					

In use? Yes/No
Ownership? State/WUA/other, specify:

II Dimensions

	Width	Height	Length	Thickness/diameter	Size of gates
Reinforced concrete					
Cement concrete					
Stone masonry					
Brick masonry					
Gates					
Lifting mechanism					

III Damage

	Repairable (m^3)/kg	To be replaced (m^3/kg)
Reinforced concrete		
Cement concrete		
Stone masonry		
Brick masonry		
Gates		
Lifting mechanism		

[18] *1= Dam, 2= Barrage, 3 Cross River Weir, 4= Diversion Wall (river), 4= Intake, 5= Check/Weir, 6= Check/Cross regulator, 7= Turnout, 8= Embankment Protection, 9= Spur 10 = Dike*

IV Rehabilitation costs

Category	**Unit**	**# of Units**	**Value**
Labour	Days		
Material	m^3		
Material	kg		
Machinery	Days		

8. TRANSITION OF MOLRWR TO MIWR

The MoLRWR gradually develops into a Ministry of Integrated Water Resources (MIWR) in charge of policy development and planning of the entire water sector. The ministry will also maintain a role in regulating water issues of national interest and in supporting the basin institutions and research and development in the water sector. A national water council will support the ministry in its role and is during the transition supported by an IWRM technical working group with representation from various ministries and agencies active in the water sector.

For the present discussion and planning the organogrammes proposed in the draft implementation plan are assumed as the final. This organogramme is shown in **Error! Reference source not found.**. It is however, understood that changes are likely to occur as a result of the adaptation to specific requirements during the implementation and further development of the concept as a result of step 6.4 below. The changes are believed to have only limited influence on the estimate investment needs.

8.1. INITIAL STEPS

Table 3 provides the initial steps to be taken for the transition from MoLRWR to MIWR, and the time schedule to implement:

Step		**Deadline/Period**
6.1	Creation of the IWRM working group for Strategy review	24 November 2011
6.2	Regular meetings of IWRM working groups	Monthly or as required until February 2014
6.3	Strategy finalized	December 2012
6.4	Development of new function descriptions for departments, including organogrammes, job descriptions and staffing.	October 2012

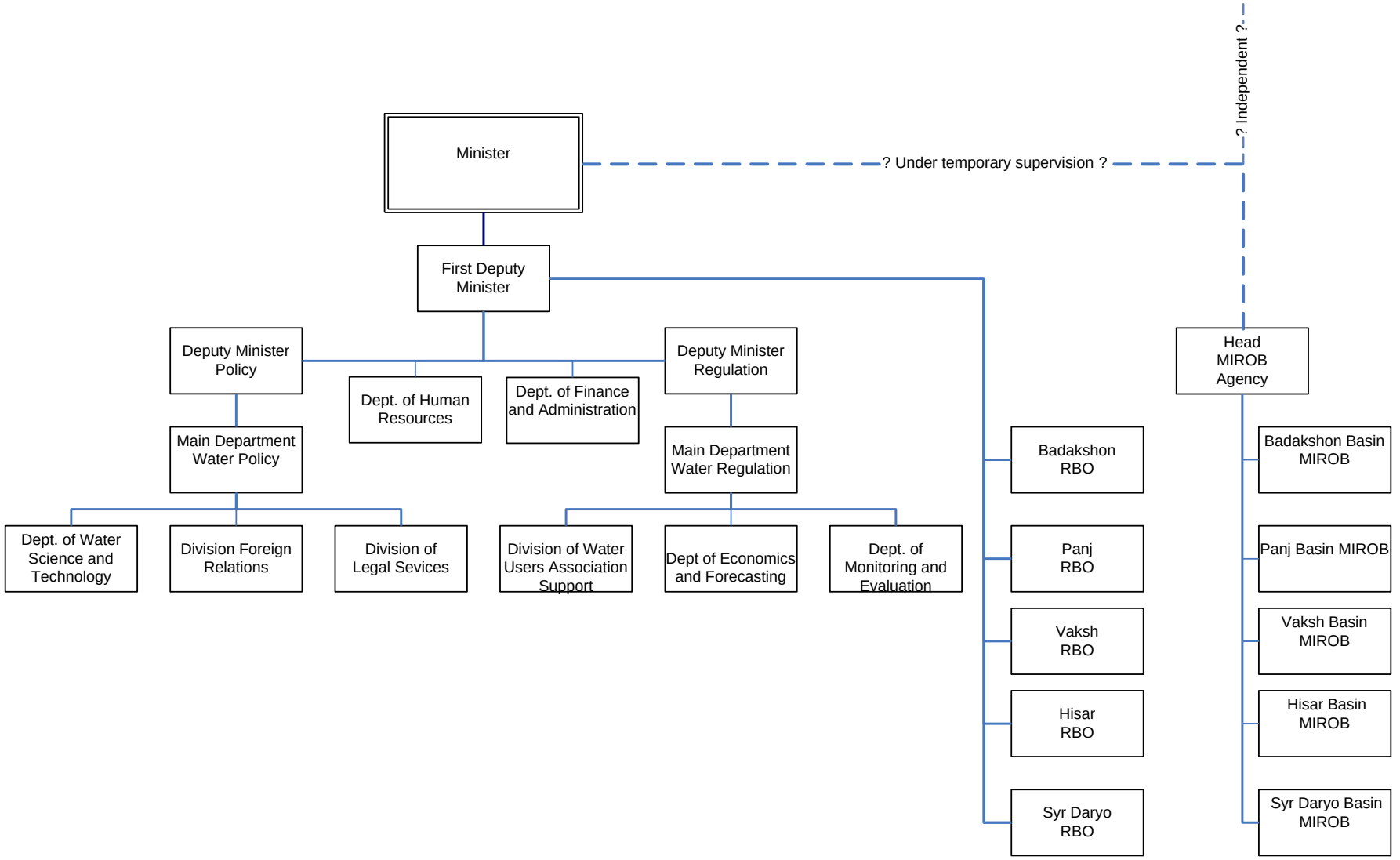
Table 3: Initial Phase Steps for the Transition from MoLRWR To MIWR

8.2. FOLLOW UP

As part of the transition an implementation and investment plan is being elaborated including some recommendations and proposed steps for the institutional and infrastructure development. Although the largest investments might be required in infrastructure, investments in institutions, tools, capacity building and machinery and equipment are equally important.

Considerable changes will be needed in the coming years and a regular updating of the organisation's and its departments' functions and staffing will be required. This process will require a well structured training and capacity building plan as well as modern human resources development and career development procedures. The reforms should aim at an efficiently functioning professional organisation with strength in a wide variety of fields, avoiding duplication of tasks. It is envisaged that the transition into a Ministry of Integrated Water Resources Management will need about 3 years and take from March 2012 until March 2015. After March 2015 the Ministry will continue to develop as a "***learning organisation***".

Figure 2: Proposed Organogramme for the management level of the MoLRWR



	Step	Deadlines/periods
6.5	Elaboration of a Implementation and Investment Plan	June2012
6.6	Regular meetings of National Water (and Energy) Council	Bi-annually from January 2012
6.7	Further development to Ministry of IWRM based on basin management, hydrological boundaries and separation of functions	Mirob Separated in March 2012, ongoing institutional development until April 2015
6.8	Change management in MoLRWR	Start Training Programme March 2012, ongoing until April 2015
6.9	Adapt budgeting to Mid Term Expenditure Framework Approach	March 2012-March 2015
6.10	Ongoing M&E, Planning, Human Resources Development and Career path planning	March 2015-2020

Table 4: Follow up Steps for the transition from MoLRWR to MIWR

8.3. DETAILED ACTIVITIES AND INVESTMENTS

In this section the activities are further detailed where necessary and the required inputs are described qualitatively and costs estimated based on a set of specified standard assumptions[19]. The cost estimate for the management of change, which is an ongoing activity from 2012 until 2020, is based on training of the key staff during the first 3 years (2012-2015), study tours and sufficient equipment and transport to function professionally. The costs for Human resources development and career development include the ongoing training activities after the transition period from 2015-2020 and an additional study tour during this period.

	Step	Inputs	Costs 2012-2020 (US$)
6.1	Creation of the IWRM working group for Strategy review	Staff, TA	5,000
6.2	Regular meetings of IWRM working groups	Staff, Transport, Location	1,000
6.3	Strategy finalized	Staff, TA	15,000
6.4	Development of new function descriptions for departments, including organogrammes, job descriptions and staffing.	Staff, TA	10,000
6.5	Elaboration of a Implementation and Investment Plan	Staff, TA	15,000
6.6	Regular meetings of National Water (and Energy) Council	Staff, Transport	10,000
6.7	Further development to Ministry of IWRM based on basin management, hydrological boundaries and separation of functions	Staff, TA	15,000
6.8	Change management in MoLRWR	Training Equipment Transport	300,000 100,000 400,000
6.9	Adapt budgeting to Mid Term Expenditure Framework Approach	March 2012-March 2015	???
6.10	Ongoing M&E, Planning, Human Resources Development and career development	Training Equipment	300,000 20,000
TOTAL			1,211,000

Table 5: Overview of steps and estimated costs for the transition of the MoLRWR to MIWR

[19] *These assumptions are provided in the annexes to the plan*

9. IMPLEMENTATION OF BASIN MANAGEMENT

One of the main principles of the water sector reforms is to manage the water resources within their natural confines, the river basins. This is the only way to carry out resource management in terms of quantity, prepare for droughts, and mitigate floods and to ensure long term water quality. Therefore the establishment of basin offices as foreseen in the present version of the regulations and charters for the MoLRWR should be carried out at once, starting next year, 2012.

For the present discussion and planning the organogramme presented in the initial draft implementation plan was adapted to the new MoLRWR plans, which due to budget limitations reduce the staffing of the River Basin Organisation initially to eight as shown in Figure 3. This could later on be expanded to the proposed structure as shown in Figure 4.

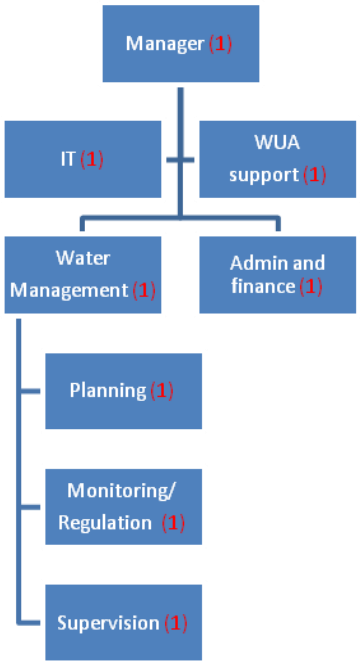


Figure 3: Initial organogramme for RBO

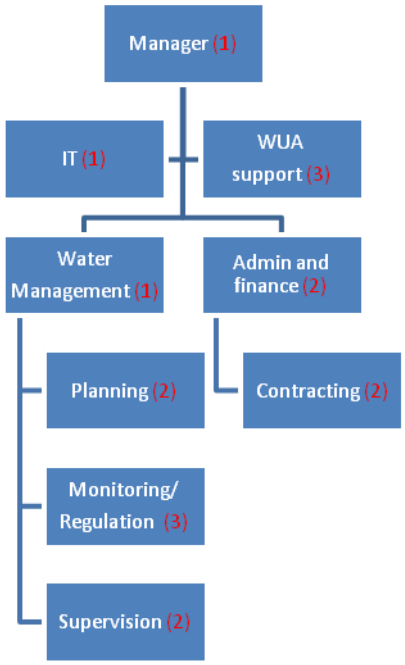


Figure 4: Final organogramme for RBO

9.1. INITIAL STEPS

Table 6 provides the steps to be taken for the implementation of the River Basin Organisation, and the time schedule to implement. The activities mainly refer to preparatory planning, establishment and early day functioning of the organisations. One pilot (Sub) basin will be established in order to gain experience with basin management and developing its institutional structures.

Step		Deadline/Period
7.1	Capacity building plan for basin level developed	June2012
7.2	Establish 5 RBOs IWRM offices	April 2012
7.3	Water allocation plans per basin	April 2012
7.4	Establish monitoring system, link to database and test in pilot basin	June 2012 – June 2013

Table 6: Initial Activities, Steps and Tim Schedule for River Basin Organisations

9.2. FOLLOW UP

The more detailed works on planning and supporting of stakeholders activities should first start in the pilot basin and be rolled out once experience is gained and the methods fine tuned. A critical element is to institute participatory planning of water management through support to and creation of WUAs, the establishment of a River Basin Council and implementing joint planning systems. The WUAs form a pillar of the water management and their creation will need to be supported simultaneously in all 5 basins. It is best outsourced to organisations which are strong in community development, i.e. the various NGOs.

Participatory planning will be piloted in one of the basins first, adapted if needed, and rolled out to the other basins. The planning will include the participatory elaboration of a basin development strategy, various basin specific policies as well as annual investment plans in institutional building and water resources development. The River Basin Organisations will play a leading role in this, supported by the MoLRWR, in the future the MIWR. The River Basin Organisations will continuously develop and adapt to the natural and socio-economic conditions of the basin, as well as the time specific demands. Therefore continued Human Resources and career development will be necessary.

	Step	**Deadlines/periods**
7.5	Capacity building	2012-2015
7.6	Roll out monitoring system	2013-2015
7.7	Establish River Basin Council	Sept. 2012-2014
7.8	Support to creation of WUAs (outsourced to NGOs but supported and regulated by Basin Organisations)	2013-2015
7.9	Pilot participatory planning in 1 (sub) basin	2013
7.10	Roll out participatory planning to other basins (gradually)	2014-2016
7.11	Continued Human Resources and Career Development	2015-2020

Table 7: Follow up Activites, Steps and Time schedule for RBOs

9.3. DETAILED ACTIVITIES AND INVESTMENTS

The main activities will be related to existing regulatory, planning and coordination tasks of the Oblvodchoz of which some staff will have to be transferred to the new River Basin Organisations. However the activities will be carried on a basin level and involve strong stakeholder coordination and support. This support will be in the form of support to creation of the WUAs and River Basin Council and the continued coaching of these organisations. The activities will also be focusing on efficiency and effectiveness. To be able to carry out the tasks on the new scale and applying modern management principles, considerable capacity building will be required in training as well as in equipment.

	Step	Inputs	Costs 2012-2020 (US$)
7.1	Capacity building plan for basin level	Staff, TA (1 week)	5,000
7.2	Establish 5 basin IWRM offices and sub basins	Staff	1,000
7.3	Water allocation plans per basin and sub basins[20]	Staff Model	1,500
7.4	Establish monitoring system, link to database and test in pilot basin	Staff, TA (10 days)	10,000
7.5	Capacity building	Training Building Improvement[21] Equipment Transport	200,000 1,000,000 200,000 700,000
7.6	Roll out monitoring system	Staff, TA (2 weeks)	15,000
7.7	Establish River Basin Council in pilot and roll out to other basins	Staff, TA (8 months)	288,000
7.8	Support to creation of WUAs (outsourced to NGOs but supported and regulated by Basin Organisations) and subsequent support and coaching	Staff[22] Outsourced NGO[23] (400 WUAs)	192,000 10,000,000
7.9	Pilot participatory planning in 1 (sub) basin	Staff, TA (3 months)	100,000
7.10	Roll out participatory planning to other basins (gradually)	Staff, TA (4*1 month)	150,000
7.11	Continued Human Resources and Career Development	Training	130,000
TOTALS			**12,993,000**

Table 8: Overview of steps and estimated costs for establishment of RBOs

[20] This is a normal MoLRWR/RBO task and does not require any additional staff time or inputs, except for the development and application of a method and/or model

[21] In order to function as a modern and efficient office, some improvements are assumed to be needed in cabling and isolation in order to have well functioning for computer rooms, modern communication and required storage for sensitive equipment

[22] Assuming 80% time 1 dedicated staff for each basin for the entire period 2012-2020, the other 20% are spent on the River Basin Council

[23] Assuming an average cost of 25,000 US$/WUA on investigations/diagnosis, support, training and strengthening.

10. IMPLEMENTATION OF THE MIROB

Similar to the need to immediately establish a River Basin Organisation under the MoLRWR an immediate start of the MIROB at basin level is required as well. Most of the operational tasks of the MoLRWR is carried out at the Basin and Scheme level. The Basin MIROB will be responsible for the O&M of large scale infrastructure in its basin, these are structures such as dams, across-the-river gated weirs (barrages) and large river bank protection works.

It is assumed that the Basin-MIROB can immediately take over the larger infrastructure for routine O&M and condition assessments[24]. Implementation of Scheme MIROBs can start in the pilot basin. Contracts with WUAs and Federations of WUAs can be made early in the next season, so water supply based on contractual arrangements can start soon as well. Asset transfer will have to rely on the database and take place slightly later.

The proposed organogramme for the Basin MIROB is in line with the one presented in the draft implementation plan. The organogrammes for the Scheme MIROBs are under development and a preliminary structure is proposed hereby. The structures are different for Pumped systems and gravity systems and for schemes with (Federations of) Water User Associations and without. The organogrammes are developed for an assumed average command area of 35,000 ha and are shown in Figure 6 to Figure 9.

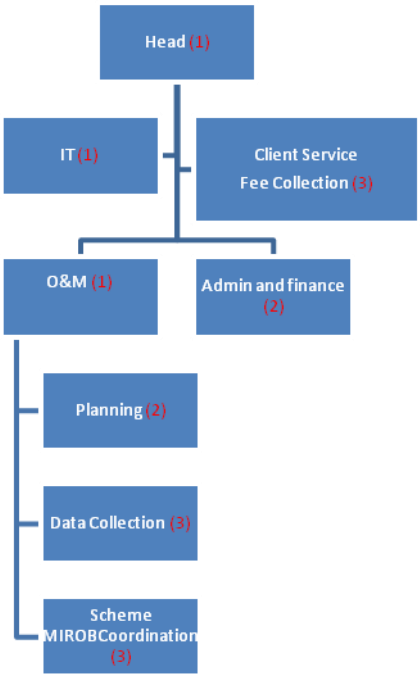


Figure 5: Basin MIROB organogramme as proposed in the first draft implementation plan

Critical issues will be to cooperate fruitfully with the WUAs, to implement monitoring of water distribution, and to professionally engage in asset management based on the database. It will also be important to establish constructive working relations for the Scheme MIROBs with the local government. Preferably the local government is in a quality monitoring position, not in a decision-making position of any kind.

[24] *It is assumed that sufficiently detailed data on functioning and condition of the larger infrastructure are available*

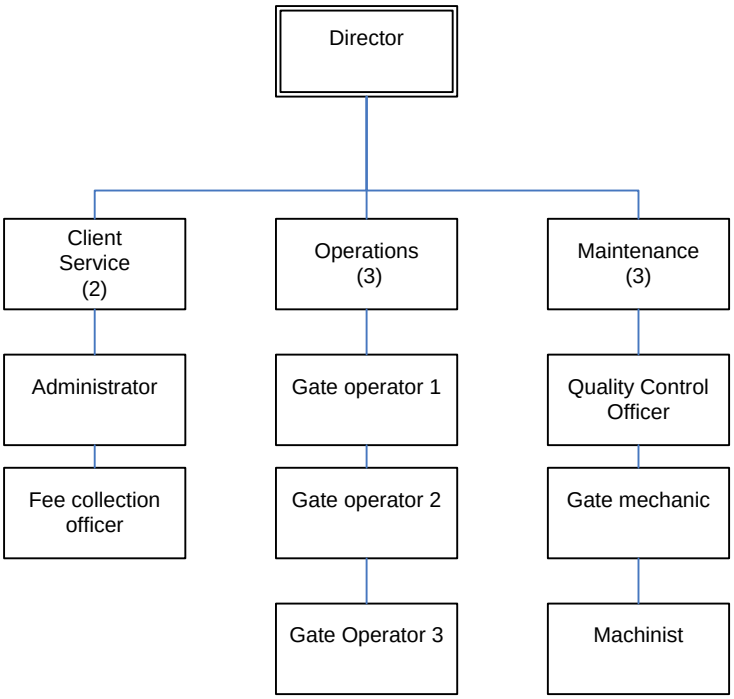


Figure 6: Suggested Scheme MIROB organogramme in scheme with WUA

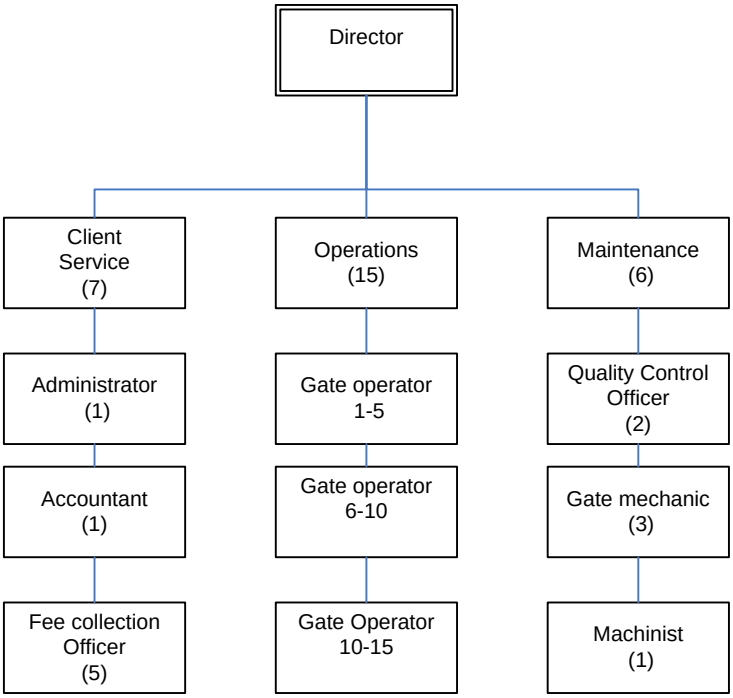


Figure 7: Suggested organogramme for MIROB in absence of WUA

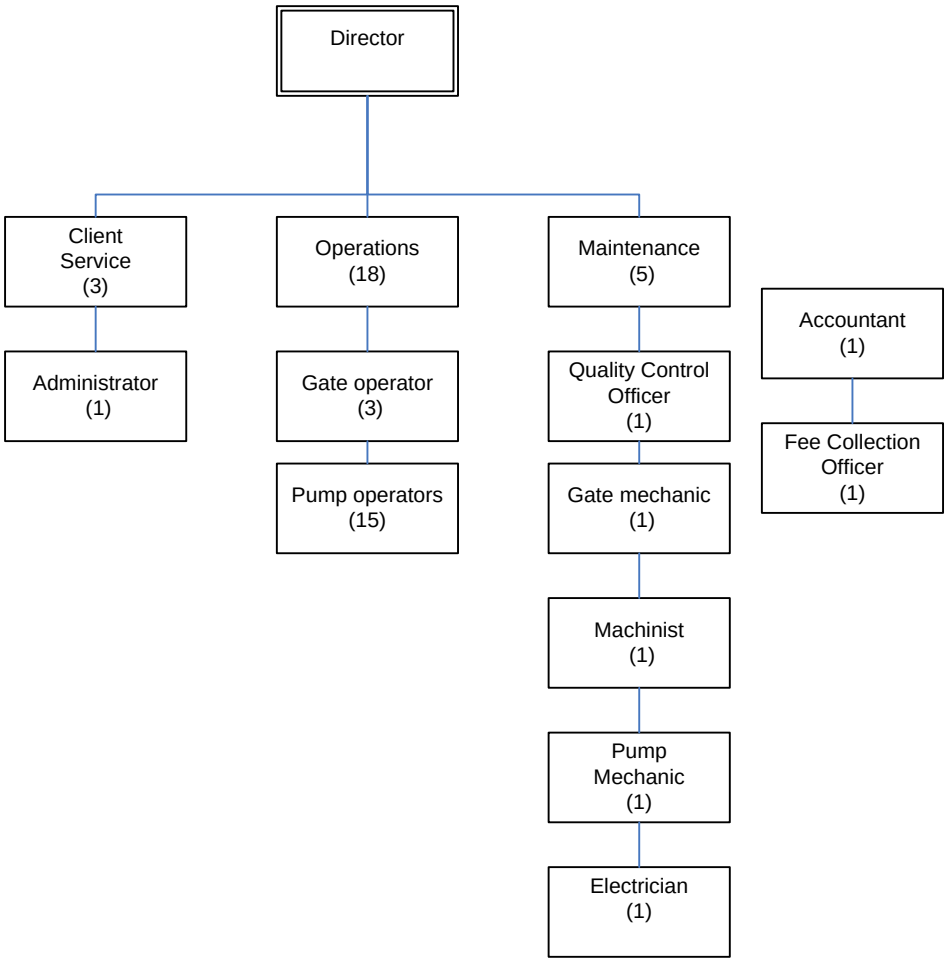


Figure 8: Proposed organogramme for a Scheme MIROB in a pumped scheme with WUAs

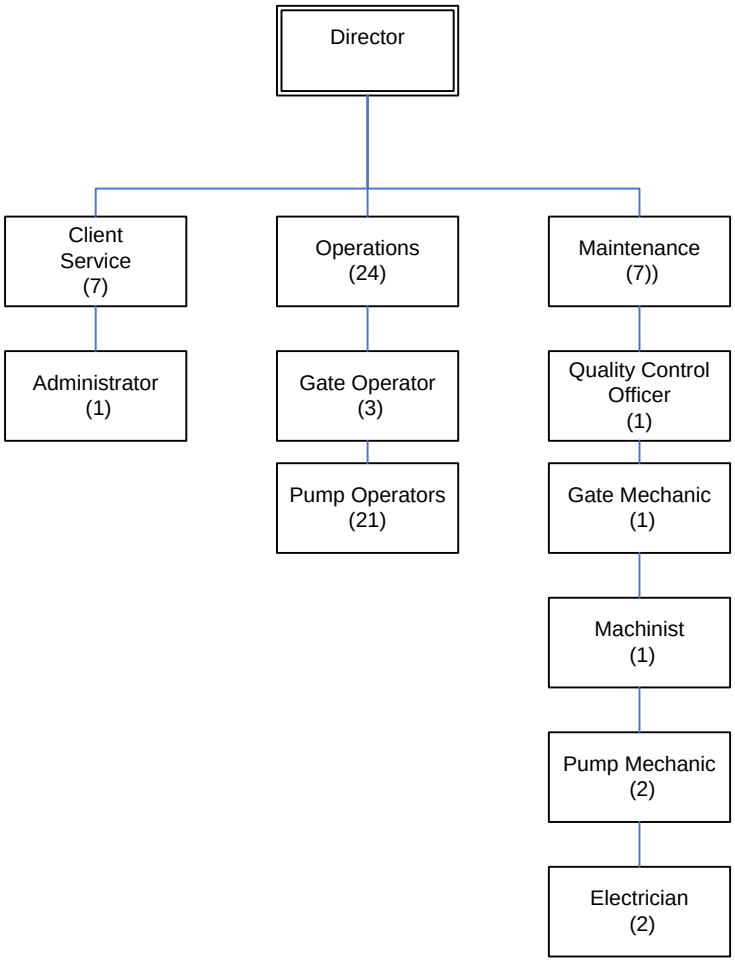


Figure 9: Scheme MIROB for pumped Scheme without WUAs

10.1. INITIAL STEPS

Table 9 provides the steps to be taken for the implementation of the Basin MIROB, and the time schedule to implement. The activities mainly refer to preparatory planning, establishment and early day functioning of the basin organisations.

Step		**Deadline/Period**
8.1	Establish Basin MIROB in 5 basins and sub basins	April 2012
8..2	Develop Scheme MIROBs in 1 pilot[25] (sub) basin	June 2012
8.3	Enter in contract with WUAs, FWUAs	April 2012
8.4	Transfer assets to Scheme MIROBs and to WUAs where WUAs exist, only to Scheme MIROBs in absence of WUAs[26]	Sept 2012
8.5	Transfer assets to WUAs, FWUAs[17]	2012
8.6	Establish monitoring system and start monitoring functioning	June 2012

Table 9: Initial Steps for establishment and functioning of MIROB at Basin and Scheme level

10.2. FOLLOW UP

Table 7 provides the follow up activities once the MIROB is established at basin level and in the pilot. Many of the activities are ongoing and cover a considerable part of the time period from 2012 to 2020.

	Step	**Deadline period**
8.7	Capacity building	July 2012-end 2020
8.8	Document the monitoring results and analyse	January 2013
8.9	Evaluate and adapt	Feb 2013
8.10	Roll out (steps 9.2 – 9.6) to two other basins	March 2013

[25] *The same (sub) basin as for the complete Basin IWRM (see section 9.1)*
[26] *According to system/criteria as agreed (section 3.3)*

8.11	Rollout to other two basins	March2014 - March 2015
8.12	Routine functioning, organisational development and monitoring, evaluation and planning	March 2015-2020

Table 10: Follow up steps for establishment and functioning of the MIROB

Although monitoring and evaluation is mentioned as a specific step this is an ongoing process, part of the monitoring cycle.

10.3. ACTIVITIES AND INVESTMENTS REQUIRED

The main activities will be related to equipping the basin MIROB offices and establishing Scheme MIROB offices. The Basin MIROB offices will mainly be located in the already existing Oblast or regional offices as in the case of the Panj basin offices in Kulyab. Sub basin offices will need to be established as well, notably for Zarafshan and Surkhob (upper Vaksh); they can probably be established at already existing offices such as e.g. the most strategically located Raivodchoz office (in Zarafshan) or the one of the canal management organisation in Surkhob. At the scheme level there will be a need to establish, improve or build Scheme MIROB offices and equip them properly, with IT equipment and connectivity as well as some maintenance equipment. Some of the materials and equipment could be transferred from the Raivodchoz offices.

	Step	Inputs	Costs 2012-2020 (US$)
8.1	Establish MIROB in 5 basins (and 2? Sub basins)	Staff	7,000
8.2	Develop Scheme MIROBS (LEUs) in 1 pilot (sub) basin	Staff[27] TA (2 months);	50,000
8.3	Enter in contract with WUAs, FWUAs	Staff, stationary[28] (2 months TA)	50,000
8.4	Transfer assets to Scheme MIROBs and to WUAs where WUAs exist, only to Scheme MIROBS in absence of WUAs[29]	Staff, documentation[30], TA (3*2 months)	300,000
8.5	Transfer assets to WUAs, FWUAs[17]	Staff, documentation, TA (2*2months)	130,000
8.6	Establish monitoring system and start monitoring functioning	Staff TA 3months	100,000
8.7	Capacity building	Buildings/offices; Machinery; Vehicles; Equipment; Training;	900,000 2,900,000 24,000,000 920,000 1,200,000
8.8	Document monitoring results and analyse	Staff, TA (5*2months)	250,000
8.9	Evaluate and adapt	Staff, TA (5*1 month)	125,000
8.10	Roll out (steps 9.2 – 9.6) to two other basins[31]		1,274,000
8.11	Rollout to other two basins		1,274,000
8.12	Routine functioning, organisational development and monitoring, evaluation and planning		
TOTAL INVESTMENTS			**33,480,000**

Table 11: Estimate Investments for establishment and capacity building of the MIROB

A quick analysis of the costs in Table 11 shows that the major cost factor, US$ 24 Million of a total of almost US$ 33.5 Million is in the machinery of the new MIROB. This cost is based on the assumptions that the scheme MIROBs will all need desilting and maintenance machinery. It does not take into account steel workshops as this is an activity that is best outsourced. A decision is required on the desirability to have basic desilting equipment (excavators and draglines) in the MIROB or to outsource this most expensive post as well.

[27] Each office is assumed to cost an additional 1,000 US$ of staffing costs due to travel, per diems, and accommodation, the offices will initially be in the Raivodchoz offices and only the service area will change from rayon to scheme. 8-10 schemes are assumed for each basin, based on work done under the institutional reforms component of the PAMP project.

[28] Each scheme is assumed to have at its end stage 15 WUAs and 1 FWUAs, at present 30% of the area is under WUA management, corresponding to approximately 50 WUAs per basin, assuming initial costs for developing contracts and required documents at 200 US$/WUA, this amounts to 10,000 US$

[29] According to system/criteria as agreed (section 3.3).

[30] Assuming transaction costs of 1,000 US$ per (future) WUA area for the total asset transfer and rehabilitation agreement process.

[31] Assuming equal cost structure as for the pilot basin.

11. REHABILITATION AND IMPROVEMENT OF INFRASTRUCTURE

11.1. IDENTIFY ACTORS AND IMPLEMENTERS

The first step is to identify who will be involved in the rehabilitation or improvement of infrastructure. If rehabilitation or improvement is carried out in close coordination with the new management, this is either the Basin MIROB, the Scheme MIROB or the (Federation of) WUA(s) generally, the quality and appropriateness of the work (i.e. building/repairing the right element) is improved. Involvement of the end-users in the process also provides an incentive for the reforms to the new organisations and improves the ownership. A clear distinction has to be made between works at different scales and who will be involved in it, before start of the actual works. This process can be started now and finalised in a few months, a reasonable target date would be June 2012 when the first scheme MIROBS in the pilot basin would assume their responsibilities.

11.2. IDENTIFY PRIORITIES

On basis of the results of the inventory/asset management database the required works are clear and an initial cost estimate exists. The rehabilitation of infrastructure should not only focus on the repairs of the old system, but wherever possible include an improvement of its functioning in a more efficient way. Often the infrastructure can be improved and perform much better, spending the same amount as what would be spent under repairs/rehabilitation. This should be taken in consideration while identifying priorities.

As indicated in the previous section, the involvement of the end-users WUAs, MIROBs, is important in priority setting. The priority setting will start in the pilot basin and a budget will be estimated for different priority levels. The strategy for pumped areas should be taken into account during this process.

11.3. START PRIORITY REHABILITATION IN THE PILOT BASIN.

On basis of the priorities a budget will be prepared and attempts will have to be made to secure funds to carry out part of the priority rehabilitation. The database should contain a routine to follow up the infrastructure rehabilitation and extract management information for the WUAs, MIROBs and the River Basin Organisation and the MoLRWR.

The same process will also be carried out in the other basins after being duly evaluated and further improved.

11.4. ACTIVITIES AND INVESTMENTS

Based on the results of the PAMP inventory about US$ 50 million is needed for rehabilitation of an area of 71,000 ha, of which 27,000 ha is pumped with a low average lift. The average per ha costs would in this case amount to 700 US$/ha. This is rather different from the studies carried out by the GIZ in Garauti mentioning a 2,000 US$/ha investment required for rehabilitation of the pumped system and a study in Zafarabod indicating a cost of 1,000 US$/ha for a pumped irrigation system.

It is therefore that only with very wide confidence margins anything sensible can be assumed for the costs of rehabilitation. Most of the area inventoried by the PAMP project is either gravity irrigated or irrigated by pumps with a very small lift. A detailed breakdown of costs became available at the end of 2011, however unfortunately the breakdown does not allow for any clear trends to be distinguished. The proportion of pump repairs in the total costs varies from 15% in Vakhsh district to 51% in Kabodiyon district and the on-farm component, potentially done for a large part by WUAs, varies from 11% in Kumsangir to 56% in Shaartus. Therefore we present the required investments in three ways, an average for all irrigated areas of 700 US$/ha or a split between gravity assuming 700 US$/ha and 2,000US$/ha for pumped systems. This would lead to an estimate between US$ 520 million to US$ 881 million. Divided over a period of 8

years from 2012 to 2020, between US$ 65 and 110 million annually would be needed, depending on the method used to calculate the costs.

The analysis is however based on scarce information and even the information provided by the inventory carried out under the PAMP Project are not very clear. Assumptions are made but not indicated in the main text and difficult to obtain from the information provided and seem to be based on “expert opinions”. Therefore more information on the status of infrastructure and basis of rehabilitation costs and the used assumptions is needed before a better estimate of rehabilitation costs can be made. The investment in the development of a database as outlined in chapter 7 would be worthwhile. The present calculations in Table 12 below give a rough indication of the margins.

	Area (ha)				Costs in US$			
Basin	**Total**	**Irrigated**	**Pumped**	**Gravity**	**All averaged**	**Pumped**	**gravity**	**combined**
1. Badakhshan basin	88,067	18,120	475	17,645	12,684,000	950,000	12,351,500	13,301,500
2. Panj basin	1,089,760	90,432	31,626	58,806	63,302,400	63,252,000	41,164,200	104,416,200
3. Vakhsh basin	2,693,624	216,103	47,714	168,389	151,272,100	95,428,000	117,872,300	213,300,300
4. Gissar basin	1,545,948	135,005	26,544	108,461	94,503,500	53,088,000	75,922,700	129,010,700
5. Sirdarya basin	2,518,536	284,196	171,062	113,134	198,937,200	342,124,000	79,193,800	421,317,800
Tajikistan	**7,935,935**	**743,856**	**277,421**	**466,435**	**520,699,200**	**554,842,000**	**326,504,500**	**881,346,500**

Table 12: Preliminary indication of investments required for rehabilitation of irrigation and drainage infrastructure

It should be noted that the present estimates only indicate the costs for rehabilitation of the existing system. However, it would be advisable to include improvement of certain infrastructures in these rehabilitation costs. Such improvement could significantly enhance the prospects for efficient water management and better crop production.

12. ROUTINE FUNCTIONING OF IWRM IN RIVER BASINS

The Ministry will become a Ministry of Integrated Water Resources (MIWR), which applies modern management principles in River Basins. The water sector gradually becomes economically viable in all its sub sectors, upholds safe extraction rates and maintains the quality of the water resources and its environmental functions.

The MIWR regularly monitors its performance and evaluates in terms of organisational management, efficiency and practical results. It applies adaptive planning of water resources quality and quantity management and protection and forms a learning organisation in all its aspects. Trans-boundary water management issues with all riparian states are actively pursued in an atmosphere of mutual respect and cooperation.