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**APPENDIX A: SECOND REVISED WATER SECTOR REFORMS STRATEGY  
PLAN**

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**For the  
The Republic of Tajikistan**

**Jelle Beekma  
Consultant  
Landell Mills Ltd.**

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## 1. SUMMARY

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In March 2006 the Government of the Republic of Tajikistan, launched its Public Administration Reform (PAR) Strategy via Presidential Decree No. 1713. The objective is to create a stable institutional system that encourages the development of new approaches to resolving management issues that impact the socio-economic development of the country. The strategy aims at increasing effectiveness of development management, improving public administration in line with the market economy principle and increasing its effectiveness through a modern and professional civil service and developing administrative and territorial management including local self governance. The present proposed strategy for water sector reforms is in line with the above principles.

The Water Sector Reform aims at laying the foundations for an Integrated Water Resource Management (IWRM) approach to the utilisation of Tajikistan's water resources, based on decentralization and outsourcing services in a transitional process towards a shared responsibility between the Government of the Republic of Tajikistan and the civil society at large. The proposed reforms are based on generally accepted guiding principles for IWRM and aim at managing and developing water resources in a sustainable and balanced way, taking into account social, economic and environmental interests.

Watershed boundaries of the major rivers will define the areas for water resources<sup>1</sup> planning and management. In five main river basins – Syr Darya, Hissar, Vakhsh, Panj, Badakhshan – the most appropriate institutional development framework for the reform process will gradually be elaborated in an adaptive participatory process.

Institutional changes for IWRM will be undertaken as much as possible in parallel in a balanced and measured progression. The separation between policy, regulatory and operational functions in water management will constitute a major principle governing change management in current institutional structures. Institutional changes will therefore be introduced at two levels:

- **Policy and strategic guidance:** Enlarging the mandate of the National Water and Energy Council to IWRM and supporting its Secretariat with *ad hoc* Technical Advisory Boards, amongst them an IWRM Working Group and a Ministry of Integrated Water Resources (Management), Its tasks would be integration of water resources policies, regulation, management and planning functions and consolidation of all water monitoring aspects (including licensing and permitting). At sub national level basin branches will carry out the policy and controlling functions for IWRM and provincial offices of line ministries for the other sectors
- **Operation:** outsourced for the different uses of water resources to various Supply Agencies based on public-private partnerships. This encompasses drinking water supply and sanitation, generation of hydropower, industry, environmental or ecosystem services, irrigation, but also tourism and recreational uses and fisheries, and any other water uses. In the case of irrigation management for instance, operations of systems would be outsourced to a MIROB Agency with subordinate State Unitary Enterprise such as its basin subsidiaries and scheme MIROBS, in close collaboration with users and their representatives. In the case of water supply in urban areas, some of it is already outsources to water supply and sanitation companies the "Vodokanals". Coordinating

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<sup>1</sup> Water resources integrate surface water and groundwater as well as the ecosystems through which they flow.

these various SUEs and as the case may be, private enterprises will be the task of the sub national policy and strategic guidance institutions, water allocation will be the task of the RBOs (the operational branch of the MoIWR).

Presently water management is split over a large number of stakeholders including government institutions, and various State Unitary Enterprises. This leads to difficulty in coordination which is compounded by the subdivision and parallel authority lines of government agencies over national, provincial (Oblasts) and district (Rayon) levels. Tajik legislation does not comprise some of the necessary provisions for the reforms and the various laws on water (such as the water code, water user associations law, law on potable water and its supply) might not all be in line with the necessary reforms, therefore a thorough review of the country Water Code and other legal frameworks will be required, followed by amendments if needed.

Public participation based on the principles of transparency and accountability is necessary for effective water resources planning, management and related decision-making. Water users of various sub sectors will therefore be represented at River Basin level through the establishment of River Basin Councils to encourage a high degree of public participation in decision-making at the user, administrative, (sub) basin and national levels.

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## **2. CURRENT SITUATION**

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The ministry of Land Reclamation and Water Resources is one of the main government agencies in the water sector, along with the Ministry of Energy and Industries, the Ministry of Agriculture, the Ministry of Health, the State Commission on Environment Protection and the Utilities State Unitary Enterprise Khojagii Manziliu Kommunalii (KMK).

### **2.1. THE MINISTRY OF LAND RECLAMATION AND WATER RESOURCES**

In December 2006 the Ministry of Land Reclamation and Water Management was restructured and renamed as Ministry of Land Reclamation and Water Resources (MoLRWR) through decree 2006 no. 595. On July 28 2009 further structural changes were made through government resolution 451. Reporting lines within the ministry were revised and the number of subordinate agencies was revised. The present structure leads to administrative territorial management units. This renders water allocation, flood preparedness and other the water management tasks in the natural flow area, the river basin, complicated and inefficient. This inefficiency is exacerbated by the subdivision of responsibilities between national, provincial and rayon governments and the large number of State Unitary Enterprises (SUEs) which are often a remnant of the past and not always based on logical divisions.

In total the ministry has a staff of more than 9,000. This includes 25 subordinate organisations ranging from State Unitary Enterprises to Scientific Institutes, four oblast offices and 65 Rayon and city offices. The reporting lines between various departments are not always clear and a number of duplications were observed in the vertical functional review carried out by PDP Ltd. It is beyond the objective of this strategy to exactly describe the functioning of the ministry and some of its subordinate agencies or SUEs, however as part of the reforms further analysis and a restructuring plan will be required.

The national staff directly on the ministry's payroll has mainly policy and regulatory function as well as some operational functions, but works closely with planning and a large O&M staff in the Provinces and Rayons as well.

The MoLRWR has tasks in various sub sectors of the water resources management. The main task is on irrigation and drainage, but water supply to rural communities and pastures and river bank protection are other major tasks included as well.

Irrigation is the major water consumer, while drinking water undeniably has the highest priority in terms of availability and quality. Bank protection is an important part of flood preparedness and an important governmental task that can difficultly become self financing. Outsourcing of the construction work, however is possible. Recently the MoLRWR was given the data of all groundwater wells by the national department of geology.

Given the diverse tasks in water management carried out by the MoLRWR it may be concluded that the ministry is probably the best positioned to evolve into an organization for introduction, policy making, and regulation of IWRM. A transition to this function will require major policy, structural and institutional revision and adjustments which need to be carried out in parallel and phased appropriately. This strategy only focuses at the main three pillars of these adjustments,

transition to basin management, introduction of the IWRM and separation of operational, organizational and regulatory and policy tasks.

The MoLRWR has set up a division for support to Water User Associations, after the enactment of the WUAs law. This division is funded through a grant from ADB and provides support to the ministry in policies for WUAs, assists in the establishment of the WUAs, arranges promotional and outreach materials and coordinates WUAs with the MoLRWR and their oblast and rayon divisions. At the oblast level water departments (Oblvodchozes) WUA support divisions have been established as well.

Apart from the restructuring required to implement the three pillars of the water sector reforms as proposed in this strategy, internal reforms in the ministry, subordinate agencies and SUEs are required as well. Possibly many of the recommendations from the Vertical Functional Review carried out by within the context of the WB funded Public Sector Reform Project could form a first step in this reform process. The recommendations with respect to establishing the MIROB, however are not completely in line with this strategy.

#### **2.1.1. The Ministry of Land Reclamation and Water Resources in the Oblasts;**

In the oblast offices a fully functional structure of the ministry is found. The tasks performed include planning of water delivery, planning of water system rehabilitation and construction, as well as water delivery, and monitoring of the Rayon water departments. There are approximately 40 people working in each of the four oblasts.

For many of the departments' needs, an elaborate process of obtaining official approvals from the central ministry or one of the SUEs at central level needs to be completed before action can be taken. An example is the requirement for spare parts, in case the spare part is in stock a three step process has to be followed from to Oblast office through the ministry, to the central warehouse in charge of the spare parts and finally after all approvals Oblast personnel have to physically obtain the part from the central warehouse. In case the part is not available (which is quite often the case) a five step process through the ministry, warehouse, and treasury of the ministry of finance is required to finally obtain the spare part. It is obvious that such procedures create unnecessary delays and should be revised during the reforms.

#### **2.1.2. The Ministry of Land Reclamation and Water Resources and Rayon Vodchozes;**

The ministry divisions at Rayon level are in principle under the control of the rayon governments. Funds for the Rayons' water divisions come from the central government to the rayon governments and are the distributed by the rayon government.

The divisions have mainly a service delivery task of water supply and operation of the irrigation and drainage systems. The departments own maintenance equipments such as draglines and excavators, however these are in very poor condition and the equipment in the worst condition is often used as source for spare parts for the more important and semi functional equipment.

The service delivery is not very efficient, for example if farmers observe a need to open the gates of a spillway because of unexpected high flows in the canal they need to communicate to the department who will then send people to verify the situation and to open the gates. The time lag between the needed flood prevention and actual action may be as much as two days, which is obviously too long in the example given. Another shortcoming is that many of the infrastructures under maintenance of the rayon water departments have not been maintained for more than 20 years and are dysfunctional even though required repairs are relatively simple and would not involve high costs.

Added to these technical and institutional problems is that water delivery is often politicized and does not correspond to the actual water requirements of the crop, but might have other objectives. Due to the decentralized approach the ministry or oblast water departments have little factual control over the water distribution. This also affects the enforcement of payment for water fees. The ministry or the oblast water departments can announce certain measures to enforce water fee payments; however the rayon government often overrules these measures through its own channels to the national government.

### **2.1.3. TojikObdehot (Rural water supply agency)**

The Tojikobdehot main department is responsible for delivering drinking water for livestock (1M m<sup>3</sup>) and human consumption (40M m<sup>3</sup>) and irrigation (lumped with livestock 4M m<sup>3</sup>) to rural areas. It serves approximately 1.5 Million people and has large piped systems, wells, pumping stations and reservoirs under its management. It has 24 offices and a Dushanbe main office and employs approximately 620 staff. The drinking water is subject to the law on drinking water and water supply and water treatment and monitoring of water quality is a task of Tojikobdehot.

The main department has an important O&M function but carries out monitoring as well. The function seems to be mainly to maintain infrastructure dating from the soviet period, not any expansion of the coverage. Tojikobdehot does levy a fee for its services with payment based on the family size.

### **2.1.4. Tajikselezaschita (Tajik river bank protection agency)**

Tajikselezaschita is a State Unitary Enterprise with as its main tasks the maintenance and construction of river bank protection infrastructure. It is involved in design and supervision, but mainly in building and maintaining of river bank embankments and spurs. The Tajikselezaschita has 14 local offices and employs approximately 1000 people.

Most of the works exist of maintaining existing bank protection or replacing bank protection that has become obsolete. Recently Tajikselezaschita has carried out works on the Kizilsu and Yaksu rivers through funds from the ADB flood risk management project, they are also, to a lesser extent, involved in the ADB funded flood management project on the Panj River. Recently a governmental resolution was approved for a 5 year workplan with a budget of 275 Million Somoni of which 165 Million should be secured from external funding.

Many of the tasks of Tajikselezaschita are not suitable for self financing. If these tasks would be transferred to the new operational MIROB agency a steady and transparent budget flow from the treasurer of the Ministry of Finance should finance its operations. Some of the design and supervision tasks probably are better placed in the MoLRWR, later the MIWR, or the River Basin Organisations.

### **2.1.5. State Unitary Enterprises of the Ministry of Land Reclamation and Water Resources**

There are a number of State Unitary Enterprises (SUEs) which would be immediately affected by any split of operational functions from policy and regulation functions as proposed in this strategy. These are mainly the SUEs related to supply of materials, maintenance of machinery, building of infrastructure and preparation of tenders and bids. A thorough review of their tasks and functions is needed as well as relations to the ministry and other SUEs in order to analyze the best position in the new organizations or the requirement to split off some of their tasks.

Some SUEs like the enterprise "Capital and land reclamation construction", are in charge of developing designs and tendering they perform typical overview functions and should probably remain in some form part of MoLRWR, later MIWR or under the River Basin Organisations.

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Others such as SUE “Construction of land reclamation systems” are typically involved in construction, rehabilitation and maintenance. They should probably be incorporated in the new operational MIROB agency and its sub ordinate enterprises. Privatisation of some of the SUEs might also be an option, but should be carefully supported and supervised in order to avoid loss of skills, equipment and materials.

### **2.1.6. Conclusions**

There is considerable duplication of tasks and functions in the present MoLRWR due to the multitude of organisations under the ministry, which often combine roles in policy, regulation and operation and maintenance at the same time. The water management is based on administrative territorial units which negatively affects the possibility for efficient water resources usage and cross sector water resources management. In-depth institutional reforms are required to streamline processes, address the duplications and improve cross sector planning through using natural flow areas as the management area. The reforms should be addressed in a parallel mode, at the same time dealing with reducing fragmentation, streamlining tasks, separating policy and operation and maintenance and changing the area of management from administrative to hydrological (and hydraulic areas) such as River Basins, watersheds, and hydraulic systems.

There is, however, a good basis for these reforms due to a number of developments institutionally as well as on the management level. State Unitary Enterprises have introduced the concept of financially autonomous units and many are functioning well in this mode this is a very valuable concept for more efficient management practices. The MoLRWR is already balancing various needs such as the needs for drinking water, irrigation, and river bank protection, which is a good basis for IWRM. The MoLRWR is also strongly aware of the need to improve fee collection and the requirement for a transparent body involved in service delivery and collection of the service fees. Lastly 220 WUAs have been established and are being supported by a WUA support division in the ministry and at provincial level. This is an important step in integrating stakeholder participation in the ministry’s general operations and functioning.

## **2.2. OTHER MINISTRIES AND ORGANIZATIONS**

Many other organizations are involved in water management. The coordination between these organizations is not very structured and it is at present complicated if not impossible to make an integrated water sector planning. This is compounded by various donors active in the same sector but following a comparable, yet slightly different, structure and sometimes supporting different organizations in the same sub sector. Alignment is needed between all the different organizations, projects and approaches.

### **2.2.1. The Ministry of Energy and Industries**

The Ministry of Energy and Industries develops policies and regulation for two closely related sectors. Industry requires sufficient and reliable energy supply in order to function efficiently. The energy sector is presently confronted with serious challenges due to the interruption of gas supplies. Gas supplied the energy for heating, cooking and a number of industrial processes, all these activities and processes are now dependent on electrical power.

#### **i) Hydropower**

Tajikistan is blessed with a very high hydropower potential and could in principle easily cover its energy demand through hydropower. Ninety eight percent of the electricity production in Tajikistan is through hydro power, at present. However, only a small proportion of the hydropower potential has been developed yet (in the water concept note of the government of 2002, it is claimed to be only about 6 percent). Therefore there is considerable potential to further develop this sector in function of economic growth. Reliable energy supply is required for

the operation of industries, small and medium scale businesses, agricultural processing, and development of the recreation and tourism sector, while hydropower reservoirs also create a potential for fishery. The dams required to create sufficient head and storage for hydropower generation can also be used for flood protection and irrigation, provided that the management is well organized and coordinated.

Construction of large dams requires high investments and long-term functioning in order to produce sufficient benefits to cover the expenses. Long term functioning depends amongst other factors on the silt load entering storage reservoirs and reducing the storage volume. In a mountainous country like Tajikistan there are generally considerable problems with silt and other sediments filling reservoirs. Effective maintenance is also of critical importance for the dam's life span.

There are a number of problems related to the (hydro) energy sector. The existing dams are less effective since their storage volumes have been reduced over time. This leads to a reduction of generation capacity while the demand for energy has increased and will increase further with economic growth. As mentioned in the previous paragraph large dam construction (and rehabilitation) is expensive and donors are only willing to invest if they can be convinced that the dams will not negatively affect other sub sectors, and that well functioning cost recovery mechanisms will be implemented.

At present it seems that coordination of the water use by different sectors is not sufficiently strong. Such coordination is dearly needed since releases of water from dams for power generation are affecting the availability of water downstream. With respect to the cost recovery, there is a considerable problem as well. The distribution system is outdated and was not designed in order to meet all energy demands by electrical power since gas provided an additional energy source for cooking heating and certain industrial and production processes. The high load to the system causes frequent disruptions of power and even a fire risk. This affects the service reliability and quality and therefore willingness to pay is generally low. There are a number of clients from governmental side as well who have not paid their debts. This causes a vicious circle development in which insufficient recovery of costs affects the ability to improve the services, which in turn leads to reduced willingness to pay.

The institutional structure of the energy sector is conducive to effective cost recovery, the operational activities have effectively been separated from the policy and regulatory functions with the creation of Barqi Tajik. However due to the problems raised in the previous paragraph, even though the institutional structure with the Ministry and Barqi Tajik is strong, its practical functioning is far from optimal. In order to achieve improved services, investments are needed in the generation, transmission and distribution system and there is a need to develop well functioning cost recovery mechanisms that are generally supported. Good coordination with the debtors and strategic choices on how to avoid future debts are essential as well.

Effective and frequent coordination is needed between the hydro energy sub sector and all other sub sectors, including exchanging experiences and applying lessons learnt between the various sub sectors. The proposed National Water Council or the already existing Water and Energy Council could serve as such an important coordination and policy developing body, supported in its task by a secretariat and the recently established technical IWRM working group. Coordination is also needed between Tajikistan and its riparian neighbours.

## **ii) Industries**

The Ministry of Energy and Industries also promotes industrial production. Industry uses water for its production processes and discharges effluent water to the river. The ministry of Energy and Industries monitors and controls the effluent quality, which is an example of a sub sector monitoring itself. The State Committee on Environment and protection provides the licenses. The enforcement of the license however is not very clearly dealt with. The control and licensing for water quantity and quality measurement is in dear need for coordination. Possibly it would be

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better if a water resources ministry, preferably its basin organisation, could be involved in the licensing and monitoring on the basis of standards developed by Energy and Industries in coordination with the State Committee for Environment and Protection.

### **2.2.2. The Ministry of Agriculture**

Agriculture is the main water user; more than 90% of the water used in Tajikistan is used for irrigated agricultural production. One of the factors affecting the farmer's ability and willingness to pay service fees for water delivery is the profitability of agriculture. This profitability is strongly affected by two factors 1) the options farmers have for cultivating the most profitable crop and 2) obtaining inputs (especially water) at the right time and in the right quantity and quality. The present conditions in the agricultural sector are not conducive to crop optimization. Consequently payment for services is difficult and the quality of irrigation infrastructure is strongly affected by the lack of payment for services. A successful improvement of water delivery services will therefore strongly depend on simultaneous and coordinated reforms in both, the Agricultural and the Water sector. In Water Management perspective the Ministry of Agriculture mainly focuses on water saving techniques.

Disrepair of irrigation and drainage systems has led to large scale salinisation. Reclamation of these areas is possible by improving drainage and supplying additional water to leach salts from the soil. The best method for drainage needs to be investigated as well along with the causes for salinisation and the effects of drainage effluent on the water quality in the river and on downstream areas. Where salinised lands can be irrigated by gravity off-the-river-flow systems, drainage and reclamation by salt leaching might well be a viable investment considering the abundance of available water of almost certainly good quality and the low costs involved in gravity irrigation.

Fisheries are another water user coordinated by the Ministry of Agriculture. The State Unitary enterprise Mohi Tojikiston was established in 2006 to support the process of increasing fisheries production. Currently the ministry is revising the 2010 draft fisheries and aquaculture strategy.

### **2.2.3. Drinking Water and Sanitation**

Drinking water use is relatively limited and reported to be in the order of 4% of the total water use. Adequate drinking water delivery, both in quantity, reliability and quality is however of the highest priority. Tajikistan aims at complying with the Millennium Development Goal, halving the fraction of the populations without access to safe drinking water and sanitation by 2015. This is a tremendous task considering the limited progress in the last decade.

Water and sanitation services development should go hand in hand, development of only drinking water without adequate sanitation is not enough. Drinking water is supplied through a number of organizations in various institutional settings. These are amongst others, Tajikobdehot (see above), the KMK as the overall lead organization to water supply companies in rural, small town areas (Vodokanals) and major cities and the water supply and sanitation companies for Dushanbe and Khujand.

#### **i) Urban water supply**

The European Bank for Reconstruction and Development (EBRD) in cooperation with the Swiss development agency SECCO have financed a successful project in water supply in Khujand city where the supply company was commercialized and collection rates of 90% on cost recovery level were realized. This model can possibly be used as an example for other major cities as well as for smaller towns. However details of the methodology are not clear, the information provided by various sources was incomplete and partially anecdotal.

## ii) Rural water supply

At present only about 35% of the rural area is served by potable water according to the Tajikobdehot, a new survey of KMK (2011) showing coverage of potable water systems for 43.4% of the villages. However, as 16% of this is out of order, in practice only 36% of the population is served by potable water systems. Although a comprehensive study was carried out, and many details of the systems were quantified, there is no good indication of the reliability of supply in technically functioning systems and no information on customer satisfaction. Additionally it must be noted that the percentages refer to the population with access to water supply systems, the water quality was not taken into account.

The role of Tajikobdehot was mentioned in a previous paragraph, there are however many more stakeholders active in rural water supply. Difficulties in convincing the rural population to pay for water services are often quoted as the major challenge in successfully implementing projects. Tajikobdehot has used small water user associations for drinking water for mobilisation and fee collection to some limited degree of success. Consultants working for the EBRD in the Southern Tajikistan Water Rehabilitation project, mention that comparable mechanisms were used successfully and it is likely that other organisations have used water user associations, groups or committees as well. International experience shows that with careful mobilizations and offering of good quality services, people are usually willing to pay for water supply services.

Institutionally the structure of the drinking water sub sector has been subject to considerable changes in the past year. However, these are not all in line with the envisaged sector reforms. The difficulties experienced in fee collection combined to a general feeling that it is unfair to charge people different service fees for the same final water use, probably lead to a recent adjustment of the water supply service fees. The fee for drinking water supply in the towns and cities was set equal for all utility companies, independent from the water supply system and its cost structure. This uniform fee is instructed through decree 234 of 30<sup>th</sup> April 2011. According to this decree, approved by the Anti Monopoly Agency (order 66 of 3<sup>rd</sup> June 2011) the fee was set to 0.4 TJS/m<sup>3</sup>. This might be a reasonable starting point in order to begin with the process of levying fees for water supply services, however it is not in line with the principle "*the user pays*" and therefore not suitable for inclusion in the reforms strategy.

Through decrees 679 and 680 of 31<sup>st</sup> December 2011 the role of KMK was defined as the regulator in the water supply sector. However, through the subordinate supply companies, the same KMK seems also to be directly in charge of the operator's role. Unless the supply companies become independent within a certain time frame, the combination of regulator and operator roles is contradictory to the separation of tasks which is one of the main principles of the water sector reforms currently being envisaged.

### 2.2.4. State Committee of Environment Protection

The state committee of environment protection is the main state authorized body on regulation of the ecological policy. Sector laws, however, define the responsibilities of executive authorities with regards to environment. The state committee has various departments, on forestry, protected area conservation and the state organisation for hydrometeorology institute (Hydromet) falls under the Committee as well. The Hydromet is in charge of 1) providing population, branches of the national economy and bodies of the state defense with hydro meteorological information and 2) preparation of short and long-term hydro meteorological forecasts, providing state enterprises with in timely information on environmental and climatic condition, particularly, warnings on extreme weather activity. It collects data from hydro

meteorological stations, monitors glaciers and avalanche prone areas, provides weather forecasts and warnings for extreme weather events and hydrometeorological disasters. The data collection by Hydromet since early last century allows for analysis of the influence of climate change and the institute is an important partner in climate change and climate resilience research and projects.

The state committee regulates various issues related to water. It provides the standards and licensing for water quality of return flows from industry and other uses. It provides licenses for groundwater exploitation, although the license for drilling and investigations is supplied by the national department of Geology and a license for water use by the MoLRWR. Although the need for a state committee on environment is not disputed, it would be more efficient to have one institution in charge of licensing on water related issues, the most indicated institute might be the River Basin Organisation.

### **2.2.5. The Committee for Emergency Situation and Civil Defense**

Tajikistan is, like other mountainous countries, very prone to natural disasters through floods, flash floods and landslides. This is exacerbated by its location along a major fault line causing frequent earthquakes. Although earthquakes are not directly related to water, they are often the trigger for landslides some of which may lead to damming of entire rivers causing unstable lakes to form behind them. Tajikistan also has large glaciers in total storing about 576 km<sup>3</sup> of water. Accelerated melting of glaciers has led to Glacier Lake Outburst Floods (GLOFs). Tajikistan is classified amongst the highest flood risk countries in the WB natural hotspots global risk analysis of 2005.

It is therefore not surprising that the country counts with a well developed Committee of Emergency Situations and Civil Defense (CoES). The CoES has as tasks to protect the population against disasters, to provide emergency response in case of emergencies and to develop policies and regulations for these tasks. Although emergencies can be in a large spectrum of fields, due to its particular situation many of the emergencies include natural disasters which are often related to water, specifically floods, and landslides.

The CoES is also in charge for forecasting and monitoring of emergencies and risk factors for emergencies. The Information Management and Analytical Center (IMAC) of the CoES conducts annually a water forecast to prepare the nation for the potential of floods and droughts during the coming year. This is a function directly related to basin management and the forecasts can form a basis for the basin water allocation planning.

The CoES has an impressive institutional structure to address emergencies. There is a central office in Dushanbe, there are regional offices in Oblasts, Raion offices, Jamoat offices and even representatives at Mahalla level. In total approximately 2000 people are working in CoES official positions. At community level volunteer groups exist for emergency response. Local groups are trained and supported in developing strategies to be prepared for emergencies and to establish stockpiles for response. In case of widespread or very serious emergencies an ad hoc Emergency Committee under the Presidency is convened with representatives from the various line ministries and agencies related to emergencies in order to coordinate the emergency response. Due to its incorporation in the army structure, the CoES has the advantage that the military can rapidly be mobilized in case of any serious disasters and emergencies, which significantly adds to its ability to respond quickly and with sufficient manpower.

Notwithstanding the large structure and considerable donor support, the challenges are such that especially forecasting and monitoring are still seen as weaknesses and considerable capacity building in this field is needed. Forecasting is also related to the preparedness for natural disasters and especially the inadequate information on potential failure of mountainous lakes with specific reference to the Sarez lake are considered one of the key challenges<sup>2</sup>.

Forecasting, monitoring and coordination of water related emergencies, especially droughts and non-localised floods would form an excellent opportunity to create synergies between the River Basin Organisations and the CoES.

### **2.2.6. Climate Change Resilience**

Climate change and its impact are difficult to gauge and a form a cross cutting issue in which many sectors of society are involved. Therefore climate change resilience is dealt with in this separate section. Tajikistan is characterized by a large proportion of mountains occupying about 93% of the country's surface area. The total area covered by glaciers is more than 11,000 km<sup>2</sup>, which stores approximately 576 km<sup>3</sup> of fresh water<sup>3</sup>. Under normal conditions Tajikistan, as described in the section on emergencies and civil defense, is prone to natural disasters due to its mountainous nature, its large amount of glaciers and location in an earthquake prone area. Under the conditions of climate change, the feeble equilibrium between natural conditions and the environment would probably be easily disturbed and natural disasters might well increase in frequency and intensity. The climate change will also likely affect the glaciers. Considerable decrease in the glacier surface area has already been observed. Therefore impact of climate variability and change in Tajikistan is expected to be significant and potentially much more severe than in many other regions of the world. At the same time the capacity to cope with the climate variability and change is low and a climate resilience policy is indispensable.

Reduction in glacier area, as monitored by the state organisation for hydrometeorology institute (Hydromet) indicates a rapid loss of glaciated area during the last 80 years (observations started in the 1930's) with a sharp increase in glacier degradation during the last decades. It is estimated that the glaciated area has decreased with almost 30% during the last decades, with considerable differences for the various glaciers studied.

Various organizations are involved in the climate change preparedness and resilience strategy and definition of practical actions related to it. The Pilot Programme for Climate Resilience (PPCR) is one of the most encompassing and has been ongoing since 2009 in Tajikistan. Under the programme a number of studies and model calculations for scenarios were conducted. The main premise of the PPCR is to develop a national climate variability and change strategy, which changes the perspective from re-active to pro-active and allows targeted donor assistance to this. This can be achieved through supporting coordination between related government (sub) sectors, and providing a framework to consider climate change as cross cutting issue in several sectors including agriculture, food security, water resources management, energy and transport. It is also important to provide opportunities for private investments in climate resilience, thereby complementing state action and contributing to institutional strengthening.

Other targeted activities under PPCR are to support human capacity building in issues relevant to climate resilience, and to support the creation of a solid evidence basis for adaption policies. Many of these activities are closely related to the tasks of the CoES, and the Committee for

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<sup>2</sup> The outburst of this lake would lead to a potential flooding of 55,000 km<sup>2</sup> affecting an estimated population of 6 million people.

<sup>3</sup> There are strong differences in the data provided e.g. UNDP water sector development strategy of 2006 gives 845 km<sup>3</sup>, whereas the Hydromet presentation on Global Warming and Glaciers in Tajikistan mentions 576 km<sup>3</sup>.

Environment Protection<sup>4</sup>. Good coordination with these two institutes will be important to achieve the goals of the PPCR.

The PPCR focuses at the national level on targeting improved data collection and analysis, improving inter sector dialogue, and introducing technical interventions that response to climate change threat in the overarching poverty reduction and human development goals. At the sectoral level it concentrates on the reduction of the vulnerability of hydro-energy to shocks, building resilience to climate change of the agricultural sector and rural economy, and improving the ability of the country to deal with climate related disasters. Proposed actions at project level include improved screening of projects to assess climate risk and to pilot adaptation to increase climate resilience, and to ensure that local knowledge and coping initiatives are integrated in project approaches. In the process the needs of the most vulnerable should be included and their participation ensured.

Among the activities proposed under the PPCR, improved data collection and analysis at national level and the reduction of vulnerability of the hydro-energy sector at the (sub) sector level, are the most relevant for this strategy. Efforts in these fields will contribute considerably to better inter (sub) sectoral dialogue and an improved basis for water allocation planning. The activities related to the ability to deal with climate related disasters are also relevant and were already mentioned in the sections on the Committee of Emergency Situations and Civil Defense.

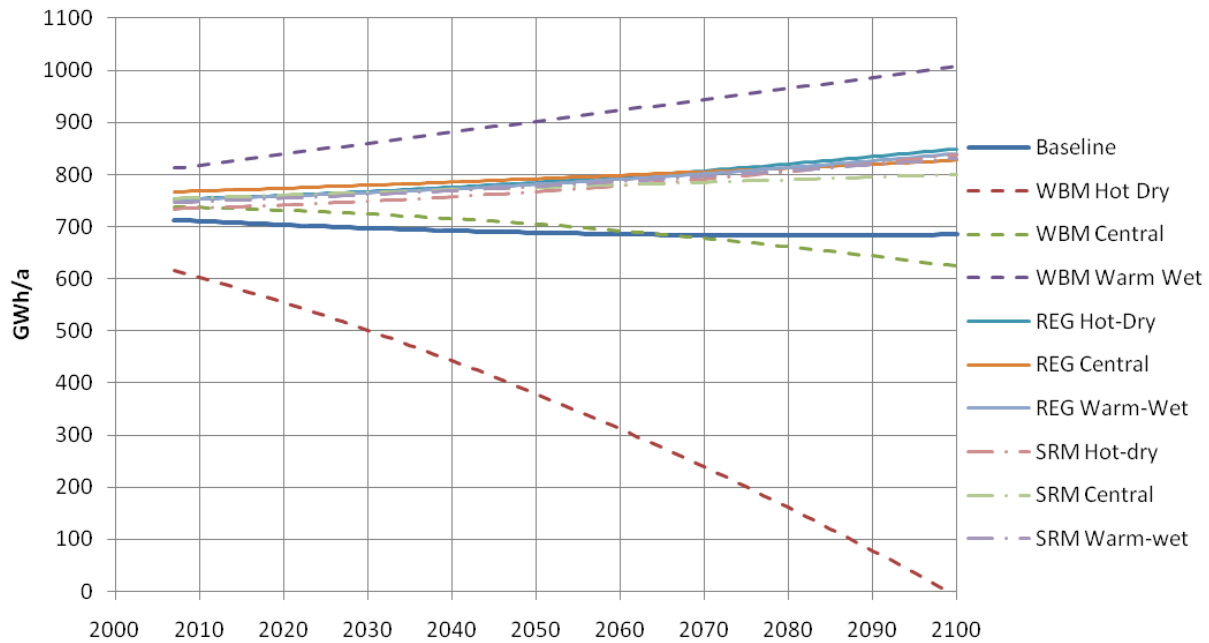
At present results of a first analysis of the vulnerability of the hydropower sector has been drafted within the context of the PPCR. Tajikistan is very sensitive to changes in hydro energy because much of its development and poverty reduction strategy builds on increased availability of affordable power. Almost all climate change models predict significant increases in temperature and thus of the glacier melt. This would consequently lead initially to higher flows in the rivers. The spillway capacity for the power plants is therefore one of the major concerns<sup>5</sup>.

The entire impact assessment of the PPCR depends on modeling with various scenarios and provides a range of conditions and outcomes from strongly increased flows (+40%) to almost ceased flows when modeled until the end of the 21<sup>st</sup> century. Due to the difficulty to provide accurate estimates of the climate change, climate resilience strategies are needed that are robust to future uncertainties. Extrapolating this to the entire water sector is quite important, for example in order to prepare the (seasonal melt) flood protection works for the uncertainties.

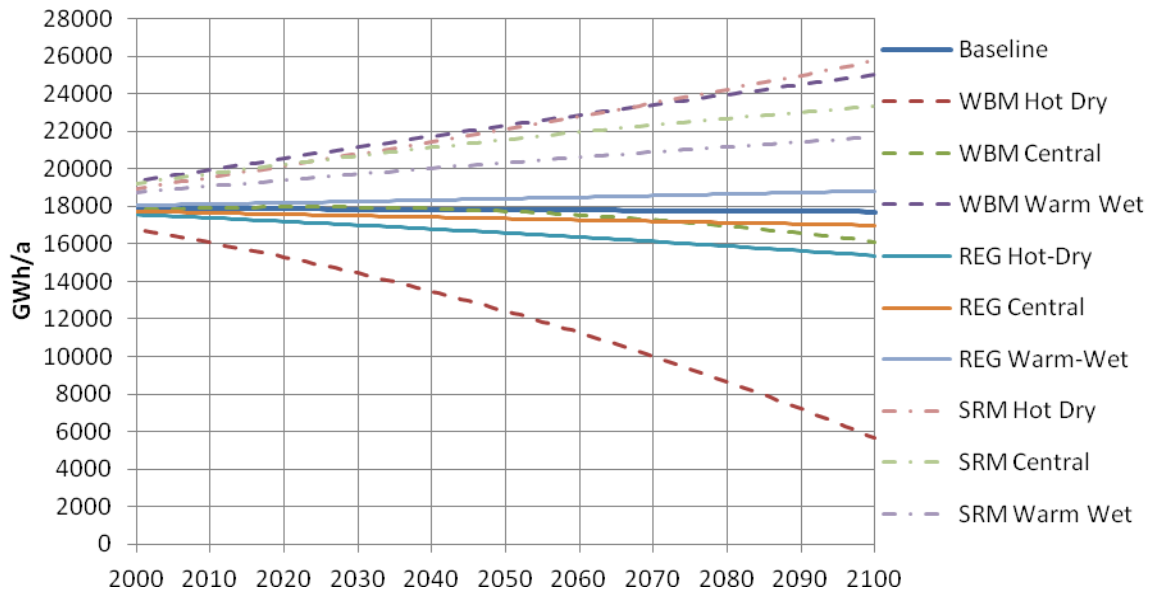
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<sup>4</sup> Specifically the state organisation for hydrometeorology institute (Hydromet)

<sup>5</sup> In the dry season however, lower flows are expected as an effect of a smaller snow pack



**Figure 1: Modelled annual power output in Karakum reservoir**



**Figure 2 Modelled annual power output for the Vakhsh cascade system**

**2.2.7. Water User Associations**

Although Water User Associations (WUAs) are not a governmental organization or agency, but quite the contrary civil society organizations, they play such an important role in IWRM as a means to participatory water management that a separate section is justified. Although water user associations can be formed for a multitude of purposes, presently the term mostly refers to Associations of Water users for irrigation and drainage.

About 220 WUAs for irrigation and drainage were formed in the last years. Different organizations have used different approaches to mobilize the water users and support the



formation of WUAs. The WUAs formed by the Water User Association Support Project are generally regarded as the most mature and best developed. They are formed on secondary canal level and federate at primary canal level in a Water User Associations Federation.

Although a WUA law exists since 2006 and has gone through a number of amendments, many of the responsibilities, and rights and duties of the WUAs are not yet clear and water management by the WUAs within their area is not applied in practice. For example operation of infrastructure in the WUA territory is still carried out by the Raion Vodchoz and therefore often (too) slow to adapt to changes in flow regime. There is no procedure yet for the Asset Management Transfer from local government and the MoLRWR to the WUAs and WUA federations. The ability of the WUAs to contribute to better water management and reduced costs on O&M will depend very strongly on the procedures adapted for the asset (management) transfer, the rights and duties given to the WUAs and success of the reforms at other levels.

It is encouraging that the MoLRWR has a special division of support to water user associations. This division is likely to have increased needs for its services during the reforms. Water user associations may be considered, apart from irrigation and drainage, for other water uses as well and procedures for their establishment and functioning should be developed. WUAs also form the basis for participation in water management and their representatives could well form an important group in the river basin councils proposed under the reforms.

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### 3. ANALYSIS AND PROBLEM DEFINITION

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From the previous sections and paragraphs the following main conclusions may be drawn:

Water Management at present is carried out on basis of territorial administrative boundaries and not on the natural flow areas. This prevents effective planning of water allocation and of development of water resources and negatively affects joint quality and quantity management and balancing of the needs of different potentially competing uses.

The water sector is strongly fragmented over various ministries and other organizations. Although this cannot be totally avoided under any circumstances, some tasks notably resource management related tasks need to be coordinated by one single institution, this also applies for licensing and regulations.

The fragmentation causes various duplications even within the MoLRWR, this is compounded by the difficulty to coordinate between ministry and local levels. A reorganization of the water sector should address this fragmentation and streamline processes.

There is a mixture of policy, policy guidance, and operational tasks found at various levels of the MoLRWR and within various subordinate organizations and SUEs. This will require reorganization of many of the departments and SUEs and will probably not allow complete institutions to shift from the ministry into a new functional group whether this functional group will be related to policy, organizational and regulatory, or operational functions. The same mixture was also observed to some extent in the drinking water sub sector and might be present in other ministries and agencies as well.

For the MoLRWR, the Rayon Vodchozes or water management departments, probably form an exception since they are mainly organized around operational tasks and many of the personnel, equipment and materials could be transferred to new operational units. The area of operation of these units will have to be reorganized on the basis of hydrological boundaries.

Joint management of water quantity and water quality is of high importance, especially for drinking water and irrigated agriculture. There is a need for monitoring of effluent quality and enforcing established norms. Present structures and mechanism do not provide a coherent framework for joint quality and quantity management.

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## 4. OBJECTIVES OF THE REFORMS

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Based on the problem analysis in the previous paragraphs, there is a need for comprehensive reforms in order to improve the water management efficiency, effectiveness and quality.

The general objective of these reforms is: ***“an efficiently planned, developed and managed water sector based on sound policies, joint analysis and management of groundwater and surface water quantity and quality, balances the different sectors that use water, using the basin as the management area, aiming at the best economic benefit for the republic of Tajikistan, in a fair and equitable manner without compromising the ecological integrity and respecting water needs of downstream countries”.***

Specific objectives are:

- 1) Water management areas changed from territorial administrative to hydrological and geo-hydrological and hydraulic management areas;
- 2) Efficient functioning IWRM based institutes on national level take care of policies and regulations that allow efficient coordination across sectors and interest groups, and at different scales, from local to international.
- 3) Transparent and accountable water governance institutes with tasks separated in policy and regulatory, organizational and regulatory, and operational follow modern efficient and performance based management principles. The policy making regulatory institutes focus on the public and common interest, the operational institutes on best operational practices and client services.

It is essential to have stakeholder involvement at all levels and during all phases of the institutional reforms to ensure support and ownership and focus on the priorities and problems of the general public.

### 4.1. GUIDING PRINCIPLES

In order to achieve the above objectives a number of guiding principles are respected, the main principle is to practice IWRM (see Figure 3). There are many definitions of IWRM essentially all using the same principles<sup>6</sup>; here we use the one developed by the Global Water Partnership (GWP) in 2002, which defined IWRM as: ***“a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.”.***

It should be noted though that IWRM is a flexible and common sense approach to water management. The reforms strategy recognizes that:

- The water sector in Tajikistan is of primordial importance and has generally been centrally managed, which introduces a number of very specific challenges and local needs;

It further builds on the Dublin principles established during the International Conference on Water and Environment in Dublin in 1992 and takes into account that:

- Water is a finite and vulnerable resource essential for life and environment;

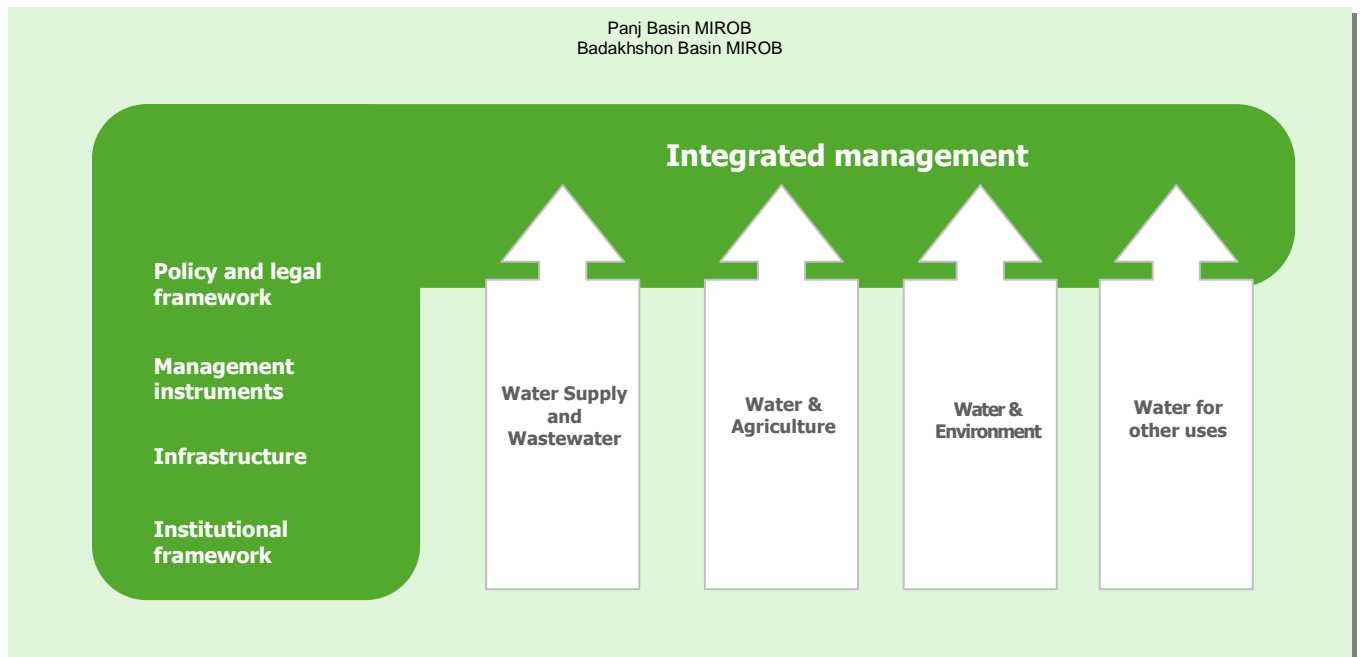
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<sup>6</sup> Although the generally cited GWP definition is given here it is recommended to develop a “Tajik agreed IWRM definition” during the reforms process.

- Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels, and decisions are taken at the lowest appropriate level;
- Women play a central part in the provision, management and safeguarding of water;
- Water has an economic value in all its competing uses and should be recognized as an economic good;
- The most appropriate geographical entity for the planning and management of water resources is the river basin, including surface and groundwater;
- IWRM in Basins is an iterative “learning by doing” management cycle process and regular evaluation of the process and readjustment of strategy and goals will be required;

Other guiding principles are:

- In order to effectively carry out all the tasks related to integrated water management a separation is needed between constitutional tasks (policies, legislations), organizational



**Figure 3: IWRM schematic according to GWP 2002**

tasks (planning, management, regulation) and operational tasks (water delivery, maintenance of systems, rehabilitation);

- Environment is recognized as a water user and its rights should not be compromised;
- In setting priorities of water use in general needs of all sub sectors should be balanced in such a way that they do not compromise other uses,
- In case of emergencies drinking water is first priority since it involves the difference between life and death. Providing water for environment is also very important since once destroyed or dead it cannot (easily) recover and its services could be lost forever.

Finally caution should be taken that engaging in institutional reforms requires absolute commitment. Reforms that are only half carried out often result in partially functioning systems which may damage the sector rather than improve it, therefore commitment and (some level of) consensus is a must.

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## 5. PROPOSED WATER SECTOR REFORM

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The following sections present the proposed comprehensive overall Sector Reform of the management and development of all Tajikistan's water resources in order to improve and rationalise the fragmented water sector planning and management as described in the previous sections. This reform aims at a sustainable, reliable and high quality water supply for the benefit of all Tajikistan's citizens; whether it involves drinking water, hydropower, industry, irrigation, fisheries, environment, transport, recreational use or any other water use. An important aspect of the reforms is user participation at all levels and in all phases.

### 5.1. VISION, END SITUATION

Vision: The water sector is effectively managed through a transparent modern public administration in partnership with the private sector, user groups and local governments, to the benefit of the Republic of Tajikistan duly respecting principles of economic growth, social equity and rights, participatory management, environmental sustainability, and obligations towards neighbouring countries.

This vision is achieved through using the IWRM principle as defined in the guiding principles, establishing river basins as the water resources management area and transferring the MoLRWR and its existing departments and sub ordinates into leading institutes in :

1. constitutional, legislative and strategic guidance asks (including organisational tasks at river basin level);
2. Operational tasks.

### 5.2. RIVER BASINS

Well defined river basins will form the basic management areas for the organisational, regulatory and operational aspects of water management and will, in addition to river flows, include groundwater, springs, lakes, glaciers and other water bodies. Management of river basins depends on their size, complexity, trans-boundary issues, number and type of users, environmental factors, etc. As part of the water sector reform, the practical understanding of river basins must be rationalized in order to ensure optimal and sustainable management. For relatively simple basins, several may be combined into one management unit.

Considering hydrological boundaries and taking into account various aspects of Tajikistan's river basin systems, five management areas or river basins were agreed within the MoLRWR on the 29<sup>th</sup> of March 2011 and documented in an official note. The basins are illustrated in **Figure 4**.

- Syr Darya Basin; consisting of the Syr Darya River within Tajikistan and its tributaries; it also includes the Zarafshan River Sub-basin (both have trans-boundary issues);
- Gissar Basin<sup>7</sup>; consisting of the entire Elok, Sarvo, Varzob-Kafernigan River system; the lower reaches are delineated as the Kafernigan sub basins. The basin also includes the

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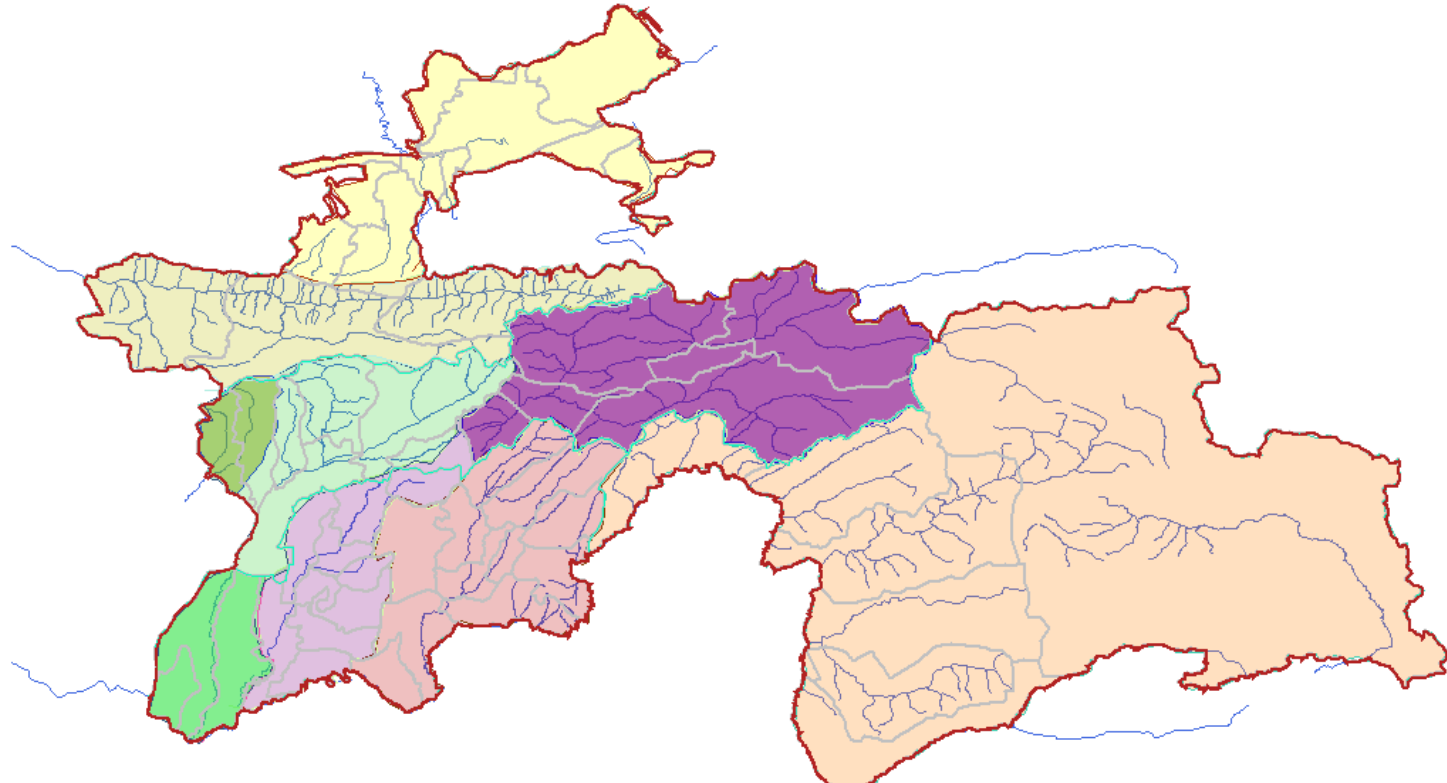
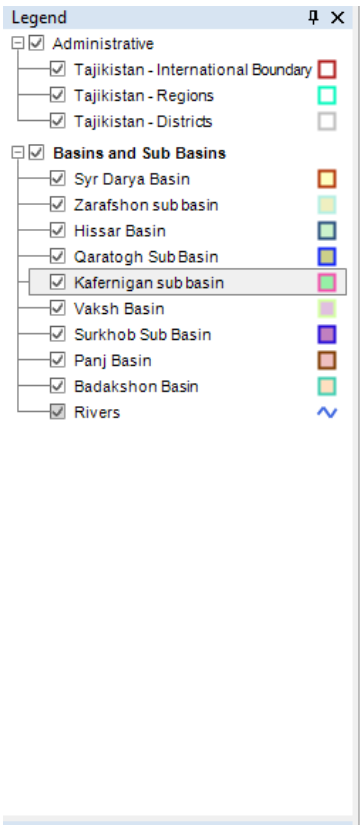
<sup>7</sup> The trans-boundary issues related to the flow of the Amu River are not well defined in the current set up, which concentrates mainly on internal issues. A choice needs to be made which of the four basins draining into the larger Amu Basin will be charged with the trans-boundary coordination. There are strong arguments for the the Gissar Basin to play this role due to its main office in Dushanbe close to the national ministries, alternatively the Vakhsh basin

Qarataq sub basin, the Qarataq River is one of the tributaries of the Surkhandarya River in Uzbekistan, which has Sub-basin has (limited) trans-boundary issues;

- Vakhsh Basin; consisting of the entire Vakhsh River and its tributaries except that part which lies in Kyrgyzstan, and the upper reaches that lie in Badakhshon. The upper part of the basin, upstream from Nurek dam forms the Surkhab sub basin;
- The Panj Basin; consisting of the River Basin Management Area including the Kizilsu and Yaksu Rivers as well as the Obiminob River, all are tributaries of the Panj River; the basin also includes the stretch of the Panj river from just upstream the confluence of the Obiminob tributary (the border with the Badakhshon Basin) until the low mountain ranges upstream from the confluence of the Vakhsh river (border with the Vakhsh basin at Qumsangir district);
- Badakhshon Basin: all of the tributaries of the Panj River in Badakhshon upstream of the Obiminob river are in this River Basin Management Area.

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*with the majority of reservoirs and generating the largest flow might be a logical choice to coordinate transboundary issues in the Amu Basin.*



**Figure 4: Agreed basins and sub basins management areas**

### **5.3. FINAL ENVISAGED ORGANISATIONAL STRUCTURE FOR INTEGRATED WATER RESOURCES MANAGEMENT**

This section provides the final envisaged institutional structure after the reforms are completed. It is based on one of the major principles of Water Sector Reform; a complete and definitive separation of the two major management functions; *Constitutional/Policy and Strategic Guidance, and Operational*. This will ensure transparency and diminish conflict of interests. The proposed structure ensures separation of these functions.

There are many significant changes that must be made in the present makeup of competing ministries, agencies, and other organisations active in the water sector if long term reform is to be effective. This, of course, will take several years to accomplish and to become fully implemented.

The proposed schematic institutional structure after completion of the water sector reforms is shown in Figure 5.



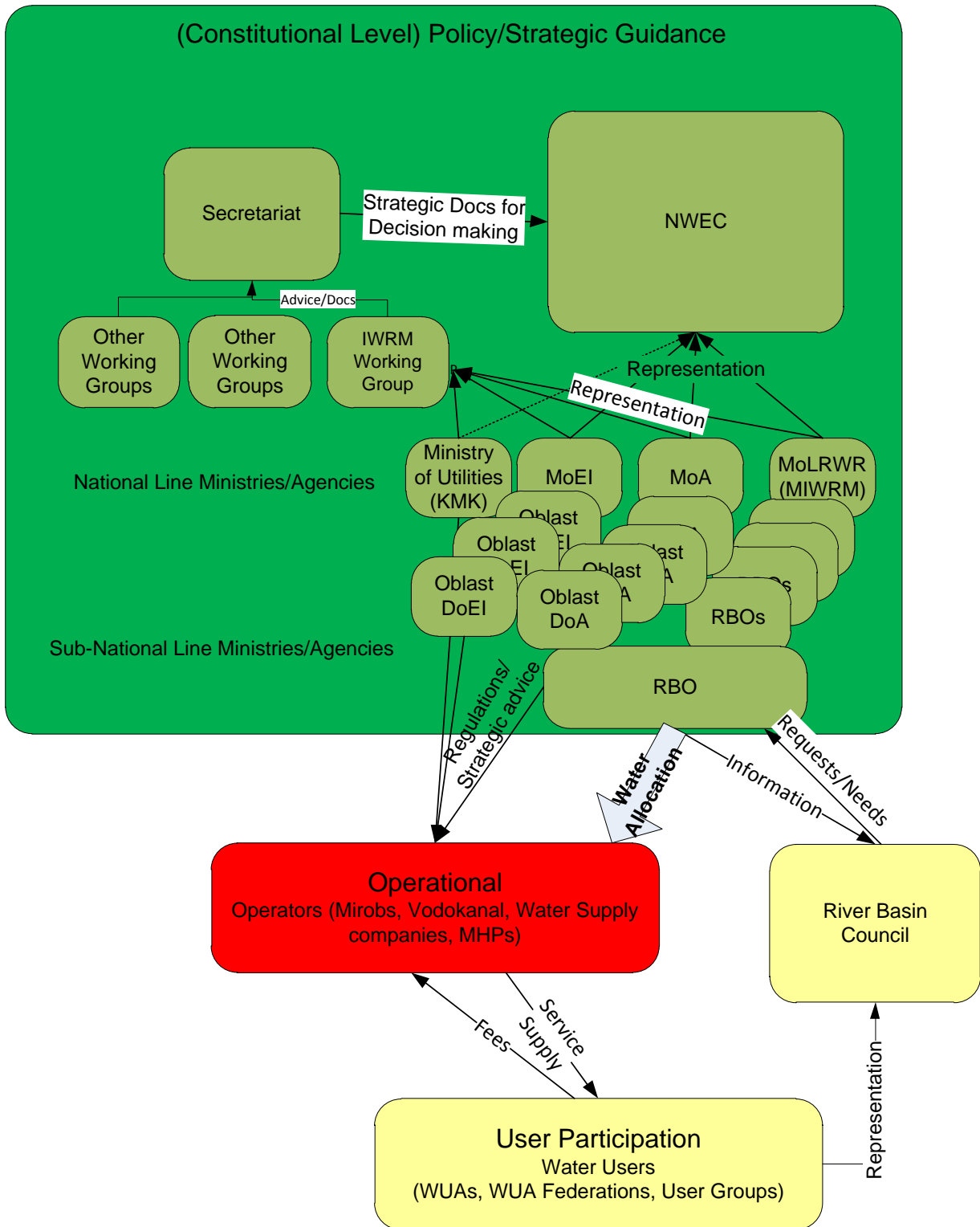


Figure 5: Proposed Schematic Framework for Institutional set up for IWRM in Tajikistan

### **5.3.1. Constitutional policy and strategic guidance Level:**

A **National Water and Energy Council** (NWE<sup>8</sup>) forms the supreme policy authority. It is supported by a Secretariat and a number of semi-permanent and ad-hoc committees and working groups, at present an IWRM Working Group is supporting the NWE<sup>8</sup> in preparing the required technical information and documents. The NWE<sup>8</sup> will provide political oversight, national water policy; approve national water strategy, river basin plans, and oversee the reform process. It is composed of representatives of all Ministries/Agencies related to the water sector.

#### **i) Roles and Responsibilities of NWE<sup>8</sup>:**

**The National Water and Energy Council being a supreme water policy authority has the following tasks:**

- Develop state policies and prepare legislation in the sphere of multiple and integrated use of water and protection of water resources for purposes of drinking water, generation of hydropower, irrigation, municipal use, industrial use, transport, environment, tourism and recreational use, and any other uses;
- Develop policy on rational use of water resources and protection of natural environment to sustain water resources for economic and social development of Republic of Tajikistan;
- Develop policies for the control over the rational usage of water resources for irrigation, municipal, industrial, hydropower, and recreational, and setting the norms and limits of water use by water users, irrespective of their form of ownership;
- Develop targeted state programmes in the sphere of effective usage and protection of water resources;
- Develop State investment policies for water resources development, usage and protection;
- Develop and regulate interstate agreements in the sphere of water resources use and protection and;
- Develop policies for preparedness for the impact of climate change on the use and protection of water resources.

The TORs of the IWRM Working Group, consisting of representatives of all sub sectors and supporting the NWE<sup>8</sup> include:

- Prepare strategic and technical documents on the request of the NWE<sup>8</sup>
- Finalise a water sector reforms strategy for discussion and agreement in the NWE<sup>8</sup>;
- Propose coordination mechanisms for the sub sector;
- Propose changes in legal frameworks required to implement the water sector reforms, these laws include:
  - water code,
  - water user association law,
  - law on drinking water and drinking water supply
  - any other relevant related laws
  - and the constitution;
- Propose decrees and regulations in order to better implement the Tajikistan specific IWRM;
- Propose the agenda for the NWE<sup>8</sup> meetings to the Secretariat;

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<sup>8</sup> The council task is not taken over by a new council, but would be carried out by the already existing National Water and Energy Council upgraded, currently being supported through the UNDP-IWRM trans boundary project. A second meeting of the council largely concentrating on water management was conducted in February 2012.

- Provide technical advice in the area of competence of the members;
- Propose issues related to transboundary water management for discussion and collect the relevant information;
- Propose coordination mechanisms between the RBOs and sub sectors;
- Other ad-hoc coordination and planning as may be required to be prepared for the NWEC.

## ii) **The Ministry of Integrated Water Resources**

A Ministry of **Integrated Water Resources** (MIWR) prepares nation-wide policies or coordinates this process if other line ministries are involved as well, the MIWR develops nation-wide water resource management standards and regulations; carried out monitoring and analysis, such as: planning, permitting/licensing, and water quality/quantity demand management for multiple uses of water resources such as drinking water supply and sanitation, hydropower generation, irrigation, industrial use, generation of hydropower, ecosystems and environmental protection but also to tourism and recreational use, transport, and any other uses.

## iii) **Roles and Responsibilities of the MIWR**

- Prepares proposals for the trans-boundary water management policy and procedures and submits for approval to the NWC;
- Develops appropriate policies for rational water use for submission to the NWC;
- Develops regulations, norms and standards for water use and water quality control;
- Regulates issues related to water services delivery payments, implementation of services pricing policy, setting of water services tariffs, etc;
- Controls and monitors the accounting of proper usage of surface and ground water resources and discharge of contaminants into nature by different ministries and agencies;
- Approves multipurpose (drinking water, irrigation, hydropower, industrial, and recreational) uses of water resources schemes and protection of water resources;
- Sets procedures for official registration and issuance of licenses; and
- Develops the detailed tasks and authorities of the River Basin Organisations as basin representatives at sub national level;
- Provides support functions for stakeholder participation of various water users including the mechanisms for setting up River Basin Councils;
- Develops standards and procedures for Asset Management Transfer to user groups;
- Prepares and implements public outreach and awareness building activities on institutional reforms, water conservation;
- Regulates other issues foreseen by the law;
- Suggests research agendas and participates in coordination of R&D in IWRM and;
- Supervises or outsources and controls the supervision of large scale infrastructural works.
- Develops in coordination with appropriate agencies, programmes for prevention and control of man-made and natural disasters and ecological crises linked with toxic influxes into water resources;

## iv) **River Basin Organisations (RBO)**

Under the MIWR, the RBOs are responsible for guiding and monitoring the plans and functions (mentioned above) for each particular basin as well as to develop annual and long term basin plans for approval and to develop, where and when needed, basin-specific policies and regulations.

## Roles and Responsibilities of the RBO

- Develops basin plans for annual water allocation, and long term water resources development and protection;
- Plans for the mitigation of droughts and floods;
- Ensures that water required for ecosystem services is available and of sufficient quality;
- Maintains records of and issues, as may be delegated by the MIWRM, licences for water use and effluent disposal;
- Instructs the MIROB and other operational companies on water allocation plans;
- Provides quality control and supervision to the MIROBs activities in water distributions and maintenance and technical support when required;
- Regularly audits the status of assets under the MIROB management;
- Supports stakeholders including WUA formation<sup>9</sup> and provides training in their organisational functioning;
- Supports conflict resolution between the WUAs, Local exploitation units and MIROB if required;
- Supports in coordination with the WUA support division of the MIWR in the Asset Management Transfer (AMT<sup>10</sup>) process and validates the status of equipment and materials handed over;
- Conducts spot checks on status of Assets handed over to WUAs and devises methods to support in case of shortcomings;
- Implements in coordination with the ministry and other organisations monitoring programmes for water usages and water quality control;
- In coordination with the MIWRM develops the concept and implementation of River Basin Councils and supports their initial capacity building
- Coordinates, consolidates and protects River Basin Council interests in the River Basin, contributes to solving problems of water users with regard to quality of, access to and distribution of quality water resources in the river basin;
- Involves the River Basin Council in planning of water allocation, water distribution and development plans for the basin;
- Promotes the increase of public awareness on water management problems of the river basin and current situation in the water management sphere;
- Supervises or outsources the supervision of medium scale works such as weirs and head-works;

The RBO has a critical function since it provides planning, strategic guidance, and monitoring functions at the basin level. Possibly in some of the sub basins, Sub Basin Organisations (SBOs) may be developed as well. SBOs will largely have the same roles and responsibilities as RBOs, but fall under the rules of (and report to) the RBO. The number of RBOs and SBOs should grow gradually and may be expanded if required in the future. At present it is proposed that the Syr Darya, Gissar, Vakhsh, Panj and Badakshan Basins be formed. Possibly highly qualified staff from provincial offices could be transferred to these RBOs.

Development and exact definition of roles and responsibilities of the MIWR and its RBOs as determined above are an ongoing and developing process, but the organisations should

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<sup>9</sup> WUAs do not need to be restricted to irrigation management only but can be related to rural drinking water supply, conservation and other water uses as well

<sup>10</sup> We use AMT and not IMT because asset management transfer is a wider the transfer might be of more than only irrigation infrastructure, it will in many cases also include drainage infrastructure, it might also include equipment, materials or be applied to other systems such as small drinking water schemes.

become effective entities within the shortest possible time span. Once established the transition process towards a fully coherent Regulatory Organisation effectively coordinating various interrelated and subordinate agencies/organisations will be an iterative process in a learning organisational context.

It is proposed that the Ministry of Water Resources and Land Reclamation (MWRLR) assumes the role of the MIWR in the initial stages of the reform. However, there must be very clear and decisive plans to evolve into an organisation with true mandates and authority in Integrated Water Resources Management as soon as possible. The same process can be assumed for the RBOs where provincial offices (Oblast Vodchozes) will initially assume some of the responsibilities, however always analysing the systems from a basin perspective.

### **5.3.2. Stakeholder participation**

#### **i) River Basin Councils (RBC)**

RBCs form the stakeholder representation platform. They will have a voice in basin planning and management activities and decision-making processes. It is made up of representatives of various user categories such as (rural and urban) drinking water, industries, irrigators, fishermen, concerned citizens or NGOs representing environmental interests, and other water users. The River Basin Councils should be based on democratic principles. They will be established and supported by the RBOs in close coordination with the MIWRM and gradually develop into more independent institutions. The exact authority of the RBCs and their judicial status and the ensuing activities RBCs will carry out need to be defined during the water sector reforms process; however some of their main tasks are outlined below.

#### **ii) Roles and Responsibilities of the RBC:**

- Regularly meetings with the RBOs will initially support the councils in secretarial functions such as convening meetings, setting the agenda and preparing supporting documents and minutes;
- Propose the desired water allocation to the various water users in the basin get advice from the RBO on its feasibility;
- Propose basin or sub basin level developments in water resources management;
- Receive information about feasibility and viability from related authorities and organisations;
- Voice concerns regarding water management issues, water distribution, water quality, service supply and is entitled on getting a reply from concerned authorities;
- Get updates on basis planning and voices opinion;
- Mediate in conflicts between different users or user groups and recommend solutions (the exact authority of these solutions to be determined);
- Has the right to inspect data records and an annual account presented by the RBO and MIROB, commercial units functioning under MIROB and any other service supplier in the larger water sector and has the right to comment on it;
- Supports stakeholders and their associations, federations and unions.

### **5.3.3. Operational Level**

#### **i) Service providers**

Operational functions will be carried out by various Agencies, depending on the use of water resources, i.e. irrigation (MIROB Agency in collaboration with users and their representatives), urban or rural water supply and sanitation (e.g. Vodokanals and Private Water Supply Companies), industry, generation and distribution of hydropower (Barqi Tajik), fisheries, environmental protection, tourism and recreational uses. The principle for the service supply companies or agencies is that they work on basis of modern business principles and full cost recovery basis.

#### **ii) Community level**

At the base level Operation and Maintenance will be carried out by Water Users grouped in user organisations or associations and possibly federations of these Organisations and Associations. In the irrigation and drainage sub-sector WUAs and their federations will assume O&M responsibility to the highest possible level they are capable of, the exact final responsibilities of the user organisations and the process to reach to this final status will be determined during the reforms process. Rural drinking water and other uses might adopt similar models. A balanced AMT programme should be developed and in the irrigation and drainage sub sector supported by the MoLRWR, later MIWR as well as the RBOs at basin level on issues of water allocation, general interest of the users, conflict resolution and organisational development. Technical issues related to the operation of water related infrastructure will be supported by the basin or Scheme MIROB. In other sub sectors users will be supported by the appropriate agency or organisation for example KMK in drinking water

The timescale of the reforms depends on many outside factors. However, there seems to be a clear momentum and excellent starting point for meaningful reforms in February 2012 and there is an excellent starting point for meaningful reforms. Some developments in 2011 have nevertheless been slightly different than according to the principles of IWRM and separation of functions, especially in the drinking water sub sector, it seems. Leadership on the general principles and course of the reforms across all sub sectors is strongly needed and can hopefully be provided by the revitalised Water and Energy Council supported by a secretariat and an IWRM working group. Various projects are jointly supporting the council, its secretariat and the IWRM working group.

#### **iii) Water User Associations**

In the Irrigation and Drainage sub-sector Water User Associations are still being formed and given considerable support. Some WUAs are sufficiently strong to engage in a process of Asset Management Transfer while the MoLRWR counts with a WUA support division. There is also a good understanding amongst many WUA members of the reforms and its legal aspects. For example in a workshop in November 2011 various representatives of WUAs from the Vakhsh Basin, Kafernigan sub basin and the Gissar Basin gave meaningful and fundamental comments on the WUA law and needs for amendments. The MoLRWR has started inventories of the assets and their value and requirements for rehabilitation which will support the asset (management) transfer. In other sub sectors meaningful developments in user organisations have taken place as well and there is more user involvement in O&M and payment for services than last year. Exact details, however are not yet available. The processes in the irrigation and drainage sub-sector should preferably be replicated in the drinking water and other sub sectors.

Possibly the processes developed in the Khujand water supply and sanitation project could be adopted as well, however more information is required.

#### **5.3.4. Separation of functions in the Irrigation and Drainage Sub-sector**

The MoLRWR also took a lead in developing a decree for the establishment of and regulations for the functioning of the MoLRWR and MIROB. The MoLRWR would assume a policy making and strategic guidance task and slowly expand its mandate from Irrigation and Drainage and Rural water Supply to Water Resources in General, while the MIROB would focus on O&M in Irrigation and Drainage.

The regulations for the MoLRWR largely in line with the proposed water resources functions, including basin organisations. Regulations for the MIROB were also developed and adapted various times with considerable support from TA and donor community. The MoLRWR organised various workshops and seminars for awareness building at local, basin and national level.

There is some discussion on the final position of the MIROB, there are basically two scenarios, one in which the MIROB would still be falling under the MoLRWR and one in which the MIROB would become totally independent from the MoLRWR. GoT has a preference for the latter and a final decision is expected by April 2012. This would bring the Irrigation and Drainage Sub-sector almost at the same stage in reforms as the hydropower sector in which the policy and strategic guidance tasks are carried out by the Ministry of Energy and Industries and the operational tasks by the open joint stock company Barqi Tajik. Details of the reforms in the Irrigation and Drainage sub sector are documented in various special TA reports (PAMP, USAID/FAO as part of the WUASP and EU framework contract).

#### **5.3.5. Legal review and amendments**

There is a need to carry out a comprehensive review of all laws related to the water sector and propose amendments in line with the water sector reforms. There have been some amendments to the water code which now clearly indicates IWRM as the basic foundation for water management in Tajikistan. New organisations are also included in the law, however they might be too prescriptive and not entirely in line with the general enabling structure of the code. In the context of the National Water and Energy Council and its supporting IWRM working group further analysis and recommendations for changes should be carried out and given sufficient time to be complete and consistent. It is suggested to use 2012 for these required revisions of the water code, related laws, and regulations, and to develop, where needed, new decrees and internal rules.

#### **5.3.6. Transition principles;**

Certain principles need to be respected to ensure that the process of the reforms is as efficient as possible; these principles are:

- Any changes to institutions will only be made once;
- It is recommended that changes be effected as much as possible within the context of the constitution and existing laws so that lengthy amendments can be avoided; this will not always be the case and if a law needs to be amended it is recommended that all changes required are processed in a comprehensive form and at once;
- The reforms should use the premise that every job loss is a tragedy for the employee involved and should be avoided to any extent possible. Therefore transfer of people to new functions and retraining for different positions will be practiced as much as possible

in combination to natural attrition if and where needed. Limited new recruitments will be needed for certain principal key positions;

- The overall principle of the operational issues will be that on the long term service delivery should be on cost recovery basis and related to the type of services supplied and the system used to supply this service. This will mean that in certain cases the same service is more expensive in one area and system than in another (for example high terraces with pumped irrigation as opposed to gravity irrigation in alluvial plains). In case the government decided that certain functions are of strategic interest and must be subsidised, a clear transparent subsidy system might be developed, which in the long term should aim to be phased out. In general, a “**user pays principle**” leads to economic use of resources;
- Equal to the "user pays principle" for water services the “**polluter pays principle**” would apply for sanitation and effluent collection services in which the costs should be related to the cleanup costs or reduction in value;
- The River Basin Structure will be implemented from the beginning (possibly starting from the transformation of the Oblast-LRWR offices (Oblvodchozes) already existing);
- The reforms should be accompanied by a well structured awareness campaign and widespread consultation of stakeholders;
- Risks related to the reforms should be minimised by in-depth analysis of the changes proposed and the support needed from institutional and legal side, specifically rationalisation of taxes, freedom to chose crops or use water for specific businesses and some user/management/ownership rights are important in order to achieve cost recovery. The government and its agencies should maintain a monitoring and supporting role in the general public interest.



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## 6. SUB SECTORS

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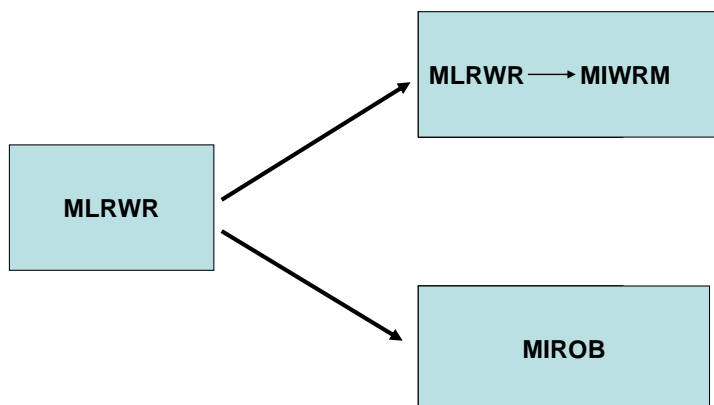
In principle Tajikistan is a water rich country, with more than 11,000 m<sup>3</sup>/capita of renewable water resources per annum. The availability is not constant over the year, but is low from late summer until the snowmelt in spring and high from spring until mid summer. This temporal variability causes some management difficulties. Another complicating factor is the mountainous terrain, which causes that many villages are far above the water level in the valleys and dependent on groundwater for drinking water resources. In the lower parts of the major river plains water quality of the groundwater is a problem, mostly because of the lack of proper well protection. In this chapter the sub sectors are briefly discussed.

### 6.1. IRRIGATION AND DRAINAGE

The largest amount of water consumption is in Agricultural Irrigation, with more than 85% of water consumed in this sector. Since irrigation cannot be sustainable without (natural or artificial drainage, the sector also includes drainage, which is not a water consumer but does influence the water quality. The high water consumption of this sub sector implies that major gains can be made in increasing the efficiency of functioning of the Irrigation and Drainage Sub-sector. It is therefore not a coincidence that considerable emphasis of the water sector reforms has initially been laid on the Irrigation and Drainage sector.

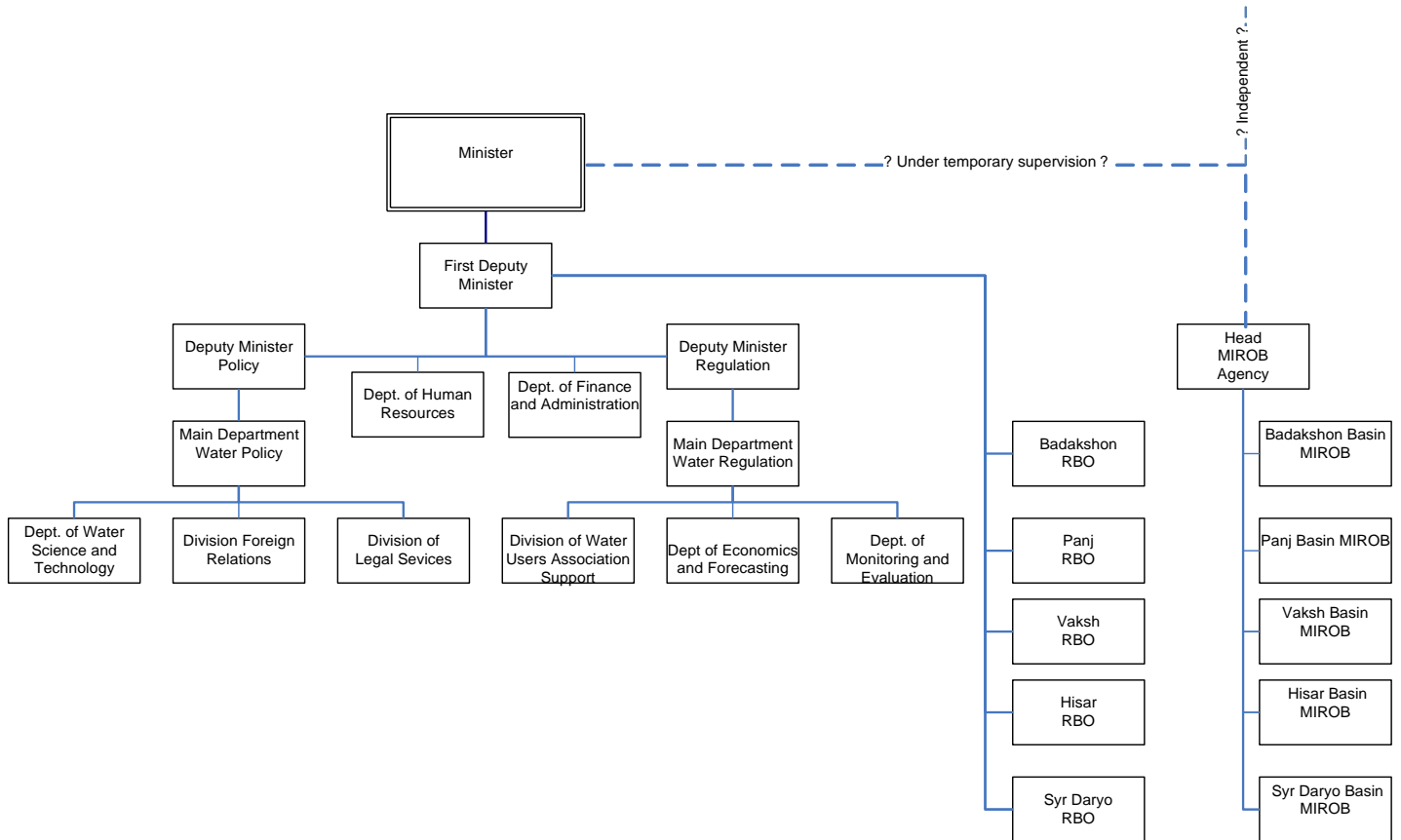
Most strategy development so far was done from the perspective of Irrigation and Drainage, which was the previous main mandate of the Ministry of Land Reclamation and Water Resources. As described in the previous sections the ministry's mandate is shifting more in the direction of Integrated Water Resources, a process that started in 2006. In the very near future the operational functions will be separated from the Ministry in the form of a MIROB agency with offices at national, basin and scheme level, each with their specific tasks. At field level operational tasks will be transferred to WUAs wherever well developed WUAs have started functioning.

The proposed reforms at national level are shown in Figure 6 and Figure 7. The Ministry of Land Reclamation and Water Resources splits into a Ministry in charge of policy and regulations slowly converting from a Ministry of Land Reclamation and Water Resources to a Ministry of IWRM and an operational organisation, the MIROB.



**Figure 6: Schematic representation of the separation of the MoLRWR into a MIWR, in charge of policy and regulations and the MIROB in charge of operations**

The Ministry and MIROB will both have basin organisations. The River Basin Organisations at basin level represent the Ministry and are in charge of the organisational and strategic guidance tasks, the basin MIROB is in charge of the operational tasks.



**Figure 7: Schematic structure of the Irrigation and Drainage sub sector after reforms.**

Due to the specific functions of the Ministry and its basin organizations the majority of personnel will be in the Ministry, which much smaller organizations at basin and sub basin level. The tasks of the MoLRWR are already indicated in 5.3.1.iii) the tasks of the MIROB would include:

- Agrees with the policy and regulatory agencies on standards for water quality, cost recovery and infrastructure operation and maintenance and supports Basin MIROBs in implementing these;
- Supports the Basin MIROBs in carrying out their functions and controls if standards are maintained;
- Provides a framework for coordination of and support to functioning of the Basin MIROBs;
- Provides technical backstopping to Basin MIROBS if and where required;
- Functions on issues related to O&M of irrigation and drainage at national level;
- Assures required technical conditions of irrigation and drainage infrastructure for on-time water delivery and effective removal of effluent as foreseen in the contract between irrigation water consumers at national level and coordinates this function of the Basin MIROBs;

- Receives drainage water from the consumers and controls the water quality at national level and coordinates this task for basin MIROBs;
- Develop cost recovery frameworks related to the permitting system for use by Basin MIROB and Scheme MIROBs and adaptation to the local conditions, gradually introducing the concept of the user/polluter pays principle;

At sub national level the MIROB would have Basin MIROBS as indicated in Figure 7. The Basin MIROBS will be subdivided into functional units at field level, preferably transferring into being independent units or companies and applying cost recovery mechanisms at scheme scale.

Tasks of the Basin MIROBs would include:

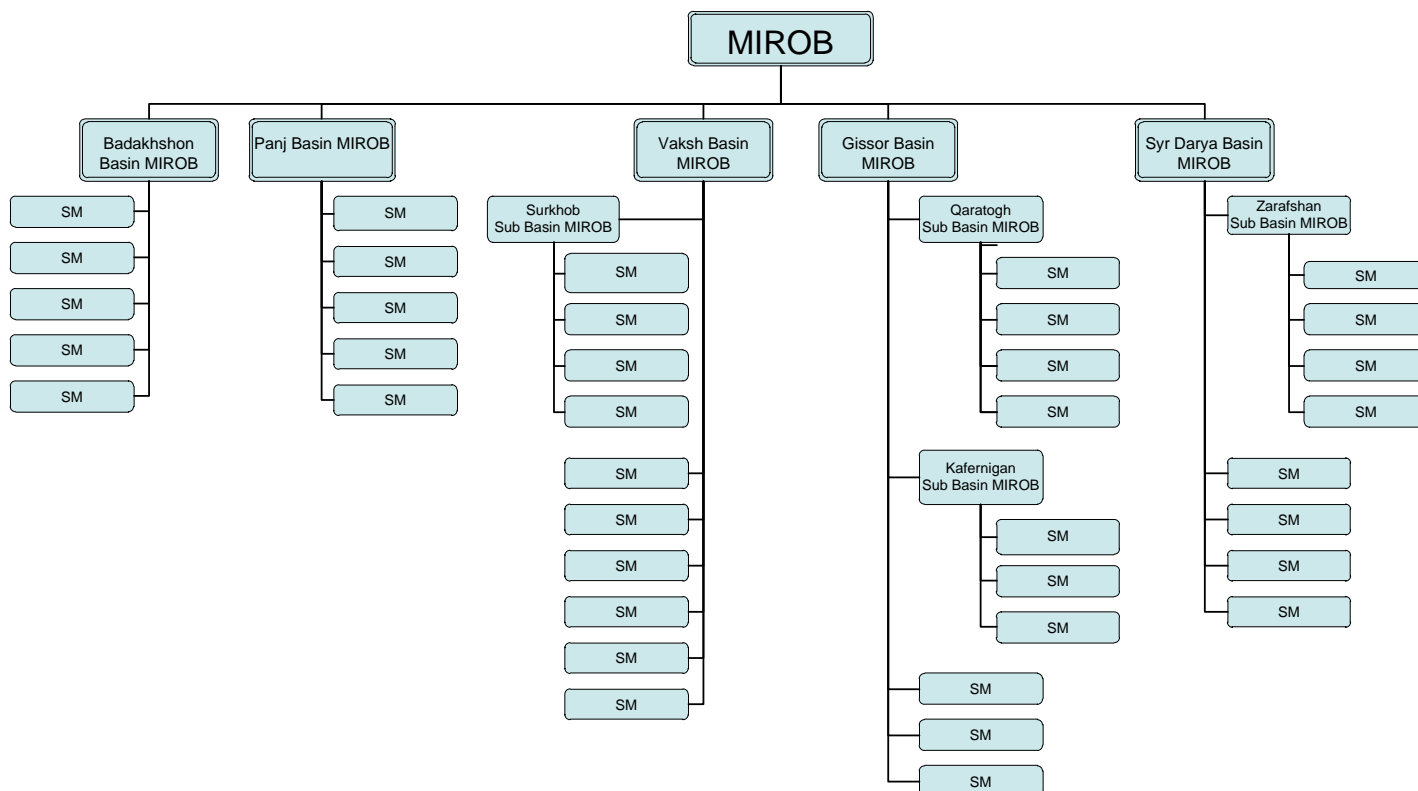
The tasks for the basin MIROB would be:

- Planning of required actions and implementation of all irrigation water supplies and return flows in the river basin on basis of the forecasts and planning of the River Basin Organisation;
- Conclude general water supply and return flow agreements with users at basin level, and operate and maintain irrigation infrastructure in the Basin under its control<sup>11</sup>;
- Obtain WUAs/Federations annual and monthly water demands (based on water forecasts by RBOs), consolidate a balanced distribution and propose to RBO and River Basin Council;
- Receive the annual allocation plan from the River Basin Organisations and balance with the WUAs demands to arrive at a water distribution plan;
- Submit water distribution plan(s) to the River Basin Council for consolidation and agreement;
- Operate the infrastructure under their control in line with the agreed water distribution plan;
- Maintain the infrastructure under their control and carry out routine repairs;
- Develop infrastructure rehabilitation and improvement plans, submit for approval to the RBOs;
- Carry out or outsource the works related to approved rehabilitation and improvement plans for the infrastructure under its jurisdiction;
- Coordinate, support and control the scheme MIROBS for operation, maintenance, rehabilitation and improvement of the infrastructure under their control as well as in terms of water quality of return flows;
- Support the process of assets transfer to WUAs and/or Federations of WUAs;
- Support WUAs and Federations of WUAs in O&M;
- Maintain a basin wide water accounting system, including drainage return flows, and water quality of drainage water and river and submit to the RBOs;
- Maintain the basin wide water service delivery fee framework as related to the permits issued by the RBO, including fees related to drainage flows and their quality;
- Maintain the service fee collection data on basin level;
- Receive the part of fees corresponding to the Basin MIROB and submit national level fees to the national MIROB.

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<sup>11</sup> the exact infrastructure to be controlled by the basin MIROBs has to be decided by the reforms implementation task force or a sub group it is suggested to only include those infrastructures with a large influence on basin water distributions such as weirs, barrages, small dams and main drains of large drainage systems

Schematically the subdivision of the MIROB is shown in Figure 8.



**Figure 8: Schematic structure of National, Basin and Scheme MIROBs**

At scheme level the MIROB will enter into contracts with the WUAs and deliver the agreed amount of water. They will also be responsible for the O&M of the intake infrastructure and the outlet of the main drain. The MIROB will also receive the effluent from the drains against an agreed quality. Where no WUAs are active yet the Scheme MIROB will take care of the in-scheme O&M. The exact size of the Scheme MIROB determines on the size and degree of complication of the irrigation and drainage systems and the presence of a WUA in the scheme.

The tasks of the Scheme MIROB include:

- Set the limits of water allocation on the irrigation scheme(s) in its area according to the range of approved limits by Basin level organizations in the schemes under its control, set the regime of pump station works and aggregates in the system;
- Make contracts on water intake and water delivery with primary irrigation water consumers and their representation organisations, pump stations, energy and communications.
- Management of irrigation water resources and return flows throughout the schemes in their areas as instructed by the MIROB Basin agency;
- Provision of water to primary irrigation water users (WUAs and Federation of Water Users) based upon license agreements, allocation limits and water distribution plans and receive return flow water from these users in agreement with the quality standards;

- Maintain headworks and main canal infrastructure as well as infrastructure in collector drains;
- Carry out routine repairs and make plans for rehabilitation and or improvement in close coordination with the water users;
- Carry out the accounting of water intake and water delivery as well as return flows and quality in the scheme(s), sub-basin/watershed system under their control, separately on each canal and hydraulic structure for different irrigation water consumers;
- Collect service delivery fees and submit agreed proportion to the basin MIROB.

## **6.2. DRINKING WATER AND SANITATION**

The amount of water used for drinking water purposes is approximately 4% of the total water withdrawals. The problems in the drinking water sector are rather common over the entire sector. Systems have deteriorated strongly due to lack of maintenance, which results in badly functioning systems, loss of water and contamination. New projects to improve water supply have suffered from the generally felt conviction that water supply is a basic human right and thus a government task and should be free of charge. Especially the improvement of drinking water supply in the rural areas has been complicated by this.

A study recently performed by the State Unitary Enterprise KMK which is in charge of coordinating regulating and operating water supply concluded that country wide slightly less than 50% has access to potable water systems. The status of systems where potable water is available is usually imperfect and the water quality was not investigated. A new law for drinking water and water supply (Law 670) was promulgated the 29<sup>th</sup> of December 2010 and drinking water quality figures prominently in this law.

Tajikistan aims to reach the Millennium Development Goal to halve by 2015 the proportion of the population without access to safe drinking water and sanitation.

### **6.2.1. Urban drinking water and sanitation**

Most progress has been achieved in urban water supply (settlements with more than 40,000 inhabitants). According to KMK 87% of these urban areas is serviced by a potable water supply service. The EBRD and SECO have been successful with an integrated approach, for example in Khujand the collection of service fees increased from 45% to almost 100% whereas the fees were increased to cost recovery level.

The integrated approach counts with:

- Corporate development and stakeholder participation;
- Establishment of the most appropriate ownership of the water companies;
- Tariff reforms to full cost recovery based on individual project level costs;
- Commercialisation of the water services using optimization of operational performance indicators;
  - Increased transparency and;
  - Improved governance.

It seems that the strategy for the Urban Type of Communities should follow the same approach. It needs to be mentioned however that in the urban centres the main activities relate to rehabilitation of systems, whereas in the Urban Type of Communities, the smaller settlements only 62% of the population is served by such systems and considerable expansion of the systems may be needed. Institutionally the water supply companies of Khujand and Dushanbe and Chkalovsk are independent, whereas the smaller towns count with water supply companies that fall directly under KMK.

### **6.2.2. Rural drinking water and sanitation;**

About 43% of the rural areas have access to potable water services, but only 40% of these services are fully functional. Rehabilitation and extension is a tremendous task. The rehabilitation and extension of the services faces the challenge of buying into some level of cost recovery, although Tajikobdehot claims that fee collection was considerably improved by

establishing Water User Associations or bounding with community leaders. In general it seems that it is necessary to go through the following steps:

1. Determination of the exact roles and future status of KMK (and Tojikobdehot) and the rural supply companies or associations and bring it in line with the general principles of IWRM and separation of functions;
2. A general awareness campaign on water supply, its importance and the need for O&M to be funded (partially) by the users;
3. Mobilisation of the targeted rural areas;
4. Establishment of Water User Associations or small companies with ample user participation in charge of service provision, O&M and fee collection with a special committee in charge for the latter;
5. Agreement on service delivery fees;
6. Construction of the system and participation in the process by contribution in labour or kind as well as in the supervision;
7. Routine O&M of the system (possibly with a certain percentage of subsidy);
8. Monitoring of delivery quantity (preferably with water meters) and quality.

### **6.2.3. River Basin Councils**

Water User Associations and members of public committees related to the urban supply companies, or supply company directors should be able to and be stimulated to participate in the River Basin Council. Representatives of rural water supply systems as well. It is probably beneficial to have Water User Associations in charge of Rural Water Supply.

## **6.3. HYDROPOWER**

Hydropower is not a water consumer but uses the potential energy in the water converted to kinetic energy and transformed to electricity. Therefore, if the releases and storage are well planned, in coordination with other sub sectors, hydropower can be developed without much effect on most of the other water sub sectors, although there will always be some effects on environment and fisheries. Tajikistan has a tremendous hydropower potential of which only little is being used. Tajikistan also has comparative advantages over other countries due to its typical geography. Hydraulic head is provided by the relief, while, if dammed, narrow valleys would form deep reservoirs with small surface area and little evaporation. The presence of bedrock in the shallow depth of unconsolidated sub soil materials would minimise percolation losses and downstream environmental effects through water-logging and salinisation.

The significant assumed mineral resources that are practically untapped could well be developed if sufficient power were available. The mining and processing of such resources requires large quantities of water, present in the natural environment, and energy which could be generated with hydropower plants. Environmental consequences of such developments would have to be carefully considered and prevention of damage and mitigation of side effects needs good planning and strict adherence.

At present 98% of the generated power is hydropower. Notwithstanding the high potential for hydropower, the population of Tajikistan is not fully supplied by electricity and especially during winter months there are frequent power-outs. This is partially due to the relatively small proportion of the hydropower potential that is being used, partially due to distribution problems and aging and deterioration of the installed capacity as well as due to the higher power demand in the winter, while river flows are the lowest during the same period.

Exact numbers on potential are difficult to provide, as the sources show widely divergent number. Some numbers are provided here just as an illustration. According to the water concept

of the Tajikistan government only about 6% of the potential is currently being used. The average annual production is approximately 15 Billion Kwh according to the Water Sector Development Strategy paper by the UNDP (2006). The installed capacity is more difficult to indicate due to the deterioration of the various power generation facilities and the sedimentation of reservoirs. The total storage capacity of all the existing reservoirs is approximately 15.3 km<sup>3</sup>, which equals about 24% of annually renewable surface water supplies formed in the national territory which are assumed to be about 64 km<sup>3</sup>. It is somewhat difficult to match the claim that only 6% of the hydropower potential is being used while the figure of 24% of the annually renewable water supplies being stored. Nevertheless there is ample opportunity to expand the hydropower generation.

At present a number of projects are finished such as Sangtuda I and almost completed, like Sangtuda II, others are in a state of advanced planning such as Ragoon, while many more projects are only in a preliminary conceptualisation state. There are differences in opinion on feasibility of various projects in the conceptualisation phase and there is discussion on how to prioritise potential sites, in relation to distance to production centres, trans-boundary issues and feasibility of the location. A comprehensive analysis and planning is needed to study the feasibility and analyse the impacts of various concepts.

The development of hydropower should aim at increased economic activities providing energy to industries, small and medium scale businesses, agricultural processing, and development of the recreation and tourism sector, which needs power to attract tourists. Development of mining and processing industries might also offer a good development potential.

Export of hydropower could be strategically important and providing the country with foreign currency. Therefore, apart from economic growth and better living conditions for the population nationally, export of power would be another important goal for hydropower development. At present there are various plans for the development of hydropower for electricity. Various options are being analysed, export through Afghanistan to Pakistan through Kunduz, Pul I Khumri, and Kabul to Peshawar, export to China once a solution is found for the Sarez lake, export through Khorogh and Wakhan to Peshawar Pakistan. The feasibility of the latter is quite in doubt due to the rough terrain. This rough terrain basically restricts the high voltage lines to the valleys, which are relatively densely populated. The restrictions of high voltage power lines in populated areas, makes it impossible to locate high voltage lines in these valleys. Under the CASA 1000 project, the objective is to create a Central Asia-South Asia Regional Energy market. In this project possibilities are being investigated to join the connection between Tajikistan, Afghanistan and Pakistan with a connection to Kyrgyzstan (and even possibly Kazakhstan) as well.

Larger hydropower structures are necessary for the supply of power to most of the larger scale economic activities as well as for power supply to cities and to neighbouring countries. Strategically hydropower should be developed in such a way that the country becomes self-sufficient and that the hydro-energy supports the economy, living conditions of the population and is well coordinated with other water users such as irrigated agriculture, drinking water, fisheries and recreation. It is highly recommended to intensify the coordination role of the energy and water council in order to achieve this coordination. Coordination is required for the national as well as for the international context.

The majority of the population of Tajikistan lives in rural areas and serving the remotest areas by large transmission lines will be prohibitively expensive. Small scale hydropower schemes could be developed for these areas, they have as advantages that they can be developed in many different locations close to the user; they do not have significant side effects, neither environmentally, nor with respect to other sub sectors. Due to the relatively small scale and



proximity to users small hydropower schemes are very suited for public private partnerships. However, during winter time there might be difficulties to generate power at various locations.

Although hydropower does not consume water, the downstream effects should always be studied since it does decrease the potential energy and thus the water head at the specific location; under certain circumstances this might affect users immediately downstream. Care should also be taken that the power generation is sufficient to contribute not only to lighting of the villages but provides the potential to small and medium scale industries and processing plants.

The following steps are recommended:

1. Use the tools under development by the various support programmes such as the Central Asia Water-Energy Development programme;
2. Carry out a critical analysis of hydropower generation capacity and potential sites and conduct basin wise model studies for their management scenarios and impacts;
3. Identify the most promising locations for large scale plants and conduct feasibility studies;
4. Carry out feasibility studies for modernisation, upgrading and rehabilitation of power plants and facilities, develop an implementation plan and implement;
5. In parallel develop the functioning of the Water and Energy Council and improve coordination;
6. Develop licensing protocols for hydropower to be registered at the RBOs.
7. Develop cost recovery mechanisms on user pay principles;
8. Gradually increase cost recovery percentages and develop mechanisms for reaching several benchmarks such as full operational costs recovery, O&M recovery and investment costs recovery to reach the goal of investments mainly through domestic resources, including income from exports;
9. Carry out regular planning and coordination for the existing dams and improve the exchange of information;
10. Include operation of hydropower plants in the annual water forecasts and management planning;
11. Develop basin management protocols for the feasible medium and large scale dams;
12. Implement feasible medium and large scale dam projects;
13. Include the effects of new construction of medium and large scale dams in the steps 3 for other “most promising locations” dams and, if still promising, continue with step 4;
14. Improve distribution networks including the high voltage lines for export of power and study the options for and benefits of connecting Tajikistan to regional power pools;
15. Assess the potential of small scale hydropower plants with some storage capacity for winter months;
16. Do feasibility studies for public private partnership hydropower schemes at an agreed number of locations;
17. Develop standards for public private partnership schemes;
18. Implement a number of example projects and benefit from the learning potential for final standards and recommendations;
19. Support and facilitate further development of public private small hydropower schemes;

20. Agree in the Aral basin context with neighbouring countries on a comprehensive integrated water resources management plan;

### **6.3.1. River basin Council**

Small hydro power owners should have access to a seat in the River Basin Council and be stimulated to participate. The large dams will be under state control and potentially be managed by private operation companies. However their impact on water distribution and timing is such that the annual plans need to be made on a basin scale and cannot be deviated from under normal conditions. In exceptional conditions a RBO sanctioned plan needs to be made. Therefore the operational authorities or companies of large dams are not suited for participation in the river basin council except as observers or invitees.

## **6.4. INDUSTRY**

The amount of water used by industry is limited to approximately 4.5% of the diverted amount according to some sources and much less according to the Ministry of Energy and Industries. However, it is unlikely that the water consumption will ever be a problem for the water balance. The main problem of industrial water use, however, is associated with the water quality of the return flows. Safe disposal or treatment of industrial water is extremely important since relatively small quantities of certain chemicals can render the water unfit for consumption or even irrigation while also threatening fishery. At present the Ministry of Energy and Industries monitors the industrial water use and effluent water quality while the committee of Environment Protection issues the license and regulates the enforcement of quality standards.

Another issue is the tariff setting for industrial use. This should likely be higher than for agriculture since industry is a high value enterprise and the risks associated by industrial use are relatively high. Return water disposal should also be permitted and charged for in line with the relative level of degradation of the water and costs related to the purification/treatment. If treatment is required to comply with the standard treatment costs should be borne by the respective industry.

### **6.4.1. Institutional arrangements and River Basin Council**

The licensing of water use and for disposal should be transferred to the RBOs or in case of water use from specific supply canals or water supply systems should be included in the license for the company. The quality rules and regulations should be strictly enforced and high penalties levied in case of violation in order to avoid water quality degradation.

It is recommended that industries have representatives in the river basin council for basins or sub basins with a high proportion of industrial activity.

## **6.5. FISHERIES**

Fish farms use approximately a very small proportion of the water in terms of consumption or diversion of water for aquaculture. Tajikistan counts with a high fishery potential due to the abundance of lakes and reservoirs. Aquaculture of fish used to be the most important source of fish. Fish production dropped dramatically from 4,000 ton annually in 1991 to about 200 ton annually in 2006, this was mainly due to a drop in production in the aquaculture. Capture fisheries in natural systems also decreased, however the total capture was always limited to only a few hundreds of tons annually.

A fisheries and aquaculture strategy for developing fish production, using the state unitary enterprise Mohii Tojikiston, was developed by the Ministry of Agriculture in 2010. It calls for private sector development of the fisheries sub-sector, adoption of appropriate legislation, development of aquaculture, protection of natural aquatic habitat, re-stocking of indigenous fish

species and international cooperation on aquatic biodiversity. From a water management point the main task is to provide access to water of sufficiently high water quality. For capture fisheries, especially in the rivers, measures need to be taken to protect and rehabilitate aquatic biodiversity. Especially in relation to hydropower infrastructure it is important to safeguard migration of fish. Re-stocking from reservoirs is potentially an alternative.

#### **6.5.1. River Basin Council**

The fishery community could be represented by representatives from private aquaculture fish-ponds and in relevant areas from fishermen who practice capture fisheries.

### **6.6. ENVIRONMENT**

Water use by the environment is hard to quantify, however it should be considered one of the priority uses in times of extreme water stress because short supply might lead to irreversible degradation. There are basically two major issues to be dealt with in the environment sub-sector related to the water sector reforms, 1) water quality management and its legislation, regulation, monitoring and enforcements of standards and 2) Water use of the environment.

Water quality management is a vital part of IWRM since the degradation of water quality exerts long term potentially serious effects on all water users and water degradation is often hard to redress or even irreversible. Contamination of natural water resources has been identified as a major problem in Tajikistan.

Some of the main recommendations related to water quality management are:

1. Enforcement of legislation on localised polluters in water protection zones and gradual removal of contaminants from these zones;
2. Enforcement of legislation on wastewater treatment;
3. Regulation followed by enforcement of regulation on the use of fertilisers and other chemicals, including mitigation of effects from storage facilities for these chemicals;
4. Regulation followed by enforcement of the regulation on treatment of sewerage water;
5. Determine standards and sanctions for violating the standards, following the "polluter pays principles";
6. Joint water quality and quantity management should become a task of the River Basin Organisations in close coordination with the State Committee for Environment Protection in charge of its policies, regulation and development of proposals for legislation.

Recommendations for water sector reforms related to water use of the environment:

1. Recognise the environment as water user with rights on water in quality and quantity;
2. Various uses maybe considered such as:
  - a. Nature reserves in high lands;
  - b. Protected areas in upper catchments;
  - c. Forests in sloping areas;
  - d. Natural grasslands in sloping areas;
  - e. Trees and vegetation on river banks;
  - f. Low lying storage areas usually with a wetland function;
  - g. Lakes and wetlands (often bird refugees as well);
  - h. Riparian wetlands in large river plains;
3. The required water consumption of the above systems should be estimated and taken into consideration for water allocation;
4. The functions for land protection and water quality improvement should be assessed in monetary terms as well;

5. Under many conditions ecosystems perform water control tasks often even better than special infrastructure, for example in flood regulation or water quality improvement;
6. Recognise in situations of shortage and water quality emergencies the environment as a priority factor to be taken into account;
7. Consider the application of payment for ecosystems, this is a relatively new concept but might on the long-term be valuable for example in land erosion and degradation control of rivers and steep valleys;
8. Apart from the direct functions, the environment and especially undisturbed ecosystems provide valuable recreation and tourism opportunities as well.

It is assumed that most of the requirements of ecosystems and the environment will be regulated by the State Committee for Environment Protection. The above mentioned action points should probably be introduced in the agenda of the committee as well.

#### **6.6.1. River Basin Council**

It is recommended that managers of reserves or ecologically valuable areas or concerned citizens or NGOs active in environmental protection become member(s) of the river basin council.

### **6.7. WATER USE FOR RECREATION AND TOURISM**

Tajikistan has a wide offer of water bodies for recreation and tourism. The large amounts of high mountainous lakes in pristine surroundings are attractive and offer excellent destinations for mountain and explorative tourism. Lower lying lakes and reservoirs probably offer more potential in the form of water sports. Hot springs and mineral water resorts also form an attraction for yet another segment of the tourism market, while wetlands along the river may attract bird watchers and other nature lovers. In order to benefit from the tourism potential, it is important to develop a minimum tourism infrastructure in line with the type of tourism. It will also be essential to maintain the quality of the water and the wetlands and careful conservation measures are required, especially if tourism would be expanded to high levels.

At present the tourism sector is only poorly developed and only few visitors come to Tajikistan annually. National recreation and tourism are also limited. There is in general a lack of information on the tourist attractions, while infrastructure in the form of transport and accommodation and gastronomic services is missing as well. Many projects at the moment target adventure tourism in far off locations. Although this is certainly one of the potential attractions of Tajikistan, this type of tourism usually attracts people with relatively limited budgets. Therefore locations with higher accessibility and potential to develop luxury accommodation and services should probably be targeted as well.

In order to develop the tourism sector, it is probably the most efficient to:

1. First target the local population with an information campaign. This might have a positive feedback on infrastructure through private initiative.
2. In parallel start education in tourism services at secondary and post high school level.
3. Regulate well to high sanitary, hygienic and environmental standards;
4. Raise environmental awareness to ensure sustainability of the tourism development. Develop and install facilities for litter deposition and sanitary services and provide good maintenance;
5. In case of accommodations established close to water bodies, water treatment should be made obligatory;
6. Develop facilities to relatively high standards suitable for international tourism;

7. Carry out information campaigns on initially national and later (after step 5) international level;
8. In some suitable locations housing schemes might be developed and attract wealthy occupants.

#### **6.7.1. River Basin Council**

In basins where tourism is well developed or with high potential, water (in its widest context) tourism entrepreneurs should be allowed and stimulated to become member of the council. Initially seats might be reserved on basis of assumed high potential.

#### **6.8. CLIMATE CHANGE RESILIENCE, STRATEGY**

The uncertainties of the climate change impact to river flow are extremely high. Therefore building in resilience in all aspects related to the water sector will be important. The limit to which this can be done is largely dependent on technologies available and the costs related to it. The various options for development of sub sectors have to be analysed with the concept of resilience as an important decision factor on its feasibility. Additionally coping strategies of the local population should be analysed and could be expanded on while the potential of targeted community activities should be assessed as well.

One of the most important aspects of the strategy is related to data collection, monitoring and forecasting to provide a sound basis for climate change resilience strategies. Much of the requirements for the data collection, monitoring and forecasting are already proposed under the emergency and disaster management strategy.

Cross (sub) sectoral coordination is important to adequately address climate resilience. Within the scope of IWRM much of the water related coordination might be carried out by the National Water (and Energy) Council, it's secretariat and working groups, the MIWRM and at basin level the RBOs, these organizations bring together most agencies relate with water and natural resources management. Since climate resilience is also strongly related to natural resources and water, the latter particularly in Tajikistan the National Water (and Energy) council, the Ministry of Integrated Water Resources (Management) and the River Basin Organisations could possibly also serve for climate resilience coordination.