The European Union's Co-Operation Programme for Central Asia

Water Governance in Central Asia

Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan

EuropeAid/125803/C/SER/MULTI

Draft Final Technical Report

May 2010

The project is funded
by The European Union

A project implemented by WYG International
in consortium with Tethys Consulting

CONTENTS

ACRONYMS

A.S.	Amu Darya
ADB	Asian Development Bank
ASREWAM	Aral Sea Support for Regional Water Management Project
BAT	Best Available Technology
BATNEEC	Best Available Technology Not Involving Excessive Costs
BPT	Best Practicable Technology
CA	Central Asia
CAREC	Central Asia Regional Environmental Centre
CEE	Central and Easter Europe
EAP	Environmental Action Programme for Central and Eastern Europe
EAP	European Action Programme
EC	European Commission
EC-IFAS	Executive Committee - International Fund for the Aral Sea
EEA	European Environmental Agency
EECCA	Easter Europe, Caucasus and Central Asia
EI	Economic Instruments
ENVSEC	Environment and Security Initiative
EPR	Environmental Performance Review
EQI	Environment Quality Indicies
EQS	Environment Quality Standard
EU	The European Union
EU WI	European Union Water Initiative
GDP	Gross Domestic Product
GEF	Global Environment Fund
GWP	Global Water Partnership
ICSD	Interstate Commission for Sustainable Development
ICWC	Interstate Coordination Water Commission
IFAS	International Fund for the Aral Sea
IFI	International Funding Institution
IMF	International Monetary Fund
IPPC	Integrated Pollution Permitting and Control
IWRM	Integrated Water Resource Management
JICA	Japan International Cooperation Agency
MAC (PDK)	Maximum Allowable Concentration
MDG	Millennium Development Goals
MDG	Millennium Development Goals
NPD	National Policy Dialogue
NPD	National Policy Dialogue
OECD	Organisation for Economic Cooperation and Development
OSCE	Organisation for Security and Cooperation in Europe
PIU	Project Implementation Unit
RBMP	River Basin Management Plan or Planning
RBO	River Basin Organisations
S.D.	Syr Darya
SAC	Special Areas of Conservation
SAP	Strategic Action Plan (UN)
SDC	Swiss Agency for Development and Cooperation
SIA	Strategic Impact Assessment
SIC – ICWC	Scientific Information Centre - ICWC
SWQS	Surface Water Quality Standards
UN	United Nations

UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
UWWTD	Urban Waste Water Treatment Directive
WARMAP	Water Resources Management and Agricultural Production
WARMIS	Water Resources Management Information System
WB	World Bank
WE	Water Efficiency
WFD	Water Framework Directive
WGCA	Water Governance in Central Asia
WMO	World Meteorological Organisation
WPI	Water Pollution Index
WQS	Water Quality Standards
WQSS	Water Quality Standards System
WSS	Water Supply and Sanitation
WSSD	World Summit of Sustainable Development
WTO	World Trade Organisation

1.0 Executive Summary

The following is the final technical report of project EuropeAid/125803/C/SER/MULTI water governance in Central Asia. It presents a synthesis of the project activities and findings in the six main themes and commentary on implementation of Integrated Water Resource Management and application of the EU Water Framework Directive in Central Asia, emphasising the limitations under the current economic constraints. The report also includes commentary of the Terms of Reference and some of the challenges faced in executing the project. The report's objective is to identify and address the steps needed to be undertaken to overcome the hurdles to improved water governance and in particular the development of Integrated Water Resource Management. The report should not be seen as a review of the water resources and water demands in the region, although a general section is included, that is covered by in detail by many other reports and studies.

The report discusses in some detail the underlying problems associated of institutional change and coordination in relation to IWRM implementation which are common to all the Central Asian states and considers how the commitment to improved environment protection through IWRM can be manifest in the short to medium term. The lack of a 'vision' of IWRM seems to be impeding change, as well as a lack of planning capacity and more critically a planning culture. The lack of a planning culture is evident not only in water quantity but also water quality issues.

Legal and institutional reviews have been carried out in the four participating countries to determine whether the legal and institutional frameworks are compatible with the concepts of IWRM and River Basin Planning. As a measure of institutional compatibility the project has developed an idealised institutional structure for IWRM implementation, which perhaps could be future goal for the Central Asian countries.

As required by the Terms of Reference, the project has developed a Water Quality Standards System (WQSS)for the Central Asian countries based on guidelines set out in the Water Framework Directive. The system has been tailored to suit the Central Asia and represents the minimum which the countries should implement and in this respect differs from the WQSS system developed by OECD for Moldova to which it has been compared. The proposed WQSS incorporates biological monitoring which is seen as a very cost effective means of screening large water resource systems. The WQSS system has been tested at two pilot sites, on the river Chu in Kyrgyzstan and Kazakhstan, and the river Vahash in Tajikistan and the initial results are presented in this report.

The use of economic instruments (EI) in both water resource and water quality management in Central Asia has been reviewed regionally and in detail in three of the participating states; the results are presented in this report. It is clear from the analysis that much work has to be done at the national level to rationalise the existing system of tariffs and charges and develop a system of economic instruments aimed to encourage water efficiency and environment protection. It is also clear that the timing is not yet appropriate for the introduction of sophisticated or regional economic instruments.

A review of national strategies has shown water resource and water quality planning in the region to be particularly weak. The countries are well practiced in monitoring and establishing the water resource and environmental status but the next step, putting together concrete plans to meet and tackle existing and future demands and problems, is poorly executed, if at all. This lack of a planning culture which exist in the ex-soviet states could be explained by past reliance on centralised planning and coordination. Centralised coordination also explains the fragmentation and the lack of lateral linkage between Ministries at the national

level which is a major barrier to IWRM. How to overcome these weaknesses is a major institutional challenge and has been a repeated focus of the project.

The project has concluded that planning process and methodologies need to be made consistent in the five Central Asian states and brought together under a regional management and decision support framework. Section 12.0 discusses the lack of distinction between a water resources plan, water resource strategy and institutional strengthening plans - often under the heading of an IWRM plan – which are being prepared by the countries, with support from various donors. With regard to the decision support framework it is recognised by all countries, through their regional agreements and membership of IFAS, that water resources has be managed at the regional, national and local levels, but there is no common understanding of the questions to be asked at each level and the reprocity and hierarchy of the resulting decisions. This is part due to a lack of vision for management of water resources in Central Asia and the countries knowing what they want and, importantly, can afford.

The report briefly describes the training which has been undertaken in the past eighteen months at the regional and national level. The training has targeted the main project themes and where possible it has been linked to practical activities. It is clear that much more training is required in the region and the project would call on the donors to coordinate their training programmes to remove duplication and inconsistency and provide a common IWRM and general management syllabus perhaps under the EC-IFAS umbrella. Within the current project little or no coordination has been possible, even between EC funded projects, and the impact of the training has been transitory since it has not been linked to development, planning or change process which would reinforce the findings.

Under project theme six, regional coordination, the project team has assisted the EC with donor coordination and has provided technical assistance to EC-IFAS in development of the Aral Sea Basin Programme III.

The last section of the report brings together the possible next steps to improve water governance and identify support elements for funding by the EC and other donors. In the final version of this report this section will be modified in light of written comments from the countries and donors and discussions held at the Final project workshop.

2.0 Project synopsis

Project Title: Water Governance in Central Asia
Project Number: EuropeAid/125803/C/SER/MULTI
Country: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan

Simplified Logical Framework

Wider Objectives: To contribute to the reduction of pollution, to fair sharing and effective use of scarce water resources, to improve the quality of shared water resources such as transboundary rivers, through the improvement, implementation and enforcement of water legislation approximated to EU standards

Specific Project Objectives:

The Project focus is the development of integrated water management approaches, by the means of:

- Reinforcing the water basin management planning through regulatory and institutional measures;
- Planning, promoting a coherent and integrated approach to water management bringing together quality and quantity issues;
- Promoting the reform of water quality standards as a tool to improve the information base for water management and basin planning, using the EU Water Framework Directive (WFD) as a reference framework.
- Promoting appropriate economic mechanisms targeted at economic operators in line with IWRM principles;
- Strengthening of legislative and regulatory framework that reinforces procedures of inter-institutional coordination, ensuring compatible approach and enabling the recognition of procedures and results of one institution by another, both within and between countries;
- Promoting the participation of user groups in the decision-making process;
- Support the further cooperation among countries in the water and environment sectors in particular in the improvement of management systems and legal and regulatory framework in the area of water quality taking into account EU WFD and international experience.

Outputs (Activities):

The expected country-specific results to enable the beneficiary countries to create the conditions for IWRM implementation are:

1. Initiatives supporting the national water and environment codes in implementation of IWRM planning concepts;
2. Provisions on institutional arrangements that enable IWRM planning, including mechanisms for stakeholder participation;
3. Proposals for new water quality standards and norms for integrated water quality management in CA countries;
4. Support to the development of appropriate economic mechanisms in line with IWRM principles, including incentive schemes where appropriate;
5. Development of procedures for inter-institutional coordination, ensuring compatible approaches and enabling the recognition of the water monitoring procedures and results of one institution by another;
6. Capacity building of water and environmental managers from partner institutions;

7. Better cooperation between countries through the existing regional structures;
8. Reinforcement of the existing regional structures that help practical implementation of regional and international agreements and conventions.

Inputs:

EC technical assistance inputs include:

- 17 months of long-term Team Leader
- 12 months of long-term Economist
- 12 months of long-term Water Quality Management Expert
- 10 months of long-term Legal and institutional Expert
- 7 months of short-term senior experts
- 80 months of short-term junior experts

Project Start Date: 9 July 2008

Project Duration: 24 months

3.0 Regional Setting and Problem Complexity

The issues of natural resources management in Central Asia have been well rehearsed in various reports and documents prepared by Donor Agencies, IFI's and UN Agencies[1]. The key environmental issues in the five Central Asian (CA) Republics (see map) where regional cooperation is most needed are as follows:

- Growing demand for water mainly for irrigation mainly in Uzbekistan and Turkmenistan, and less so in Kazakhstan[2];
- Growing energy needs that would be met from new hydro power investments highland
- countries (Tajikistan and Kyrgyzstan);
- . Disposal of untreated waste leading to deterioration of water quality in transboundary rivers (Tajikistan, Uzbekistan, Turkmenistan, Kyrgyzstan, Kazakhstan);
- Unsustainable land management leading to land degradation and soil erosion (Turkmenistan, Uzbekistan, Kazakhstan, Tajikistan and Kyrgyzstan);
- Making preparations for adaptation to the climate change and climate variability (Turkmenistan, Uzbekistan, Kazakhstan, Tajikistan and Kyrgyzstan).

The water scarcity and competition for the scarce water resources has been highlighted as a major regional issue and the good governance of those waters a root cause of the problem. There is sufficient absolute quantity of water within the region, and measured against any indicator, per capita water availability in CA is well within that of well endowed countries[3]. There is no general scarcity of water resources in the region; huge amounts of water are stored in the mountains in Tajikistan and Kyrgyzstan (see e.g. the league tables in the World Resources Institute statistics)[4].

The major issue in Central Asia is not insufficient water quantity[5] , but the imbalanced water consumption against average annual flow generation. Although Afghanistan, Tajikistan and Kyrgyzstan are the most upstream countries in the Aral Sea basin provide about 80% of the annual flow, water withdrawals for these three countries totals 17%. The picture for the downstream states (Uzbekistan, Kazakhstan and Turkmenistan) is exactly the opposite.

[1] See for example the Central Asian Environmental Outlook, (ADB), and the UN Human Development Report (UNDP 2007). In these assessments the territories of the countries of CA the geo-climatic region encompasses the peaks of the TienShan and Pamir mountain ranges to the arid plains that end in the inland sea of the Aral.

[2] In Kazakhstan the irrigation system on the Syr Darya River has been repaired and improved which increased its water flow. Since the Kokaral dam, which separated the North Aral Sea from the disappearing South Aral Sea in Uzbekistan, has been completed in 2005 the North Aral Sea level has risen by more then 8m and continues to rise gradually returning near its original level. Uzbekistan has no plans to reduce abstraction from the Amu Darya river as a source of water for cotton irrigation, and instead is moving towards oil exploration in the drying South Aral seabed.

[3] A country is considered water scarce when annual water supplies drop below 1,000 cubic meters per person. The situation in Central Asia is very different between downstream and upstream countries. In 1998 it has been evaluated that annual water supplies were 704 cubic meters per person for Uzbekistan and 232 for Turkmenistan. On the other hand, the figures were 4,484 for Kazakhstan, 11,171 for Tajikistan and 10,394 for Kyrgyzstan (World Resources Institute, 1998: 305).

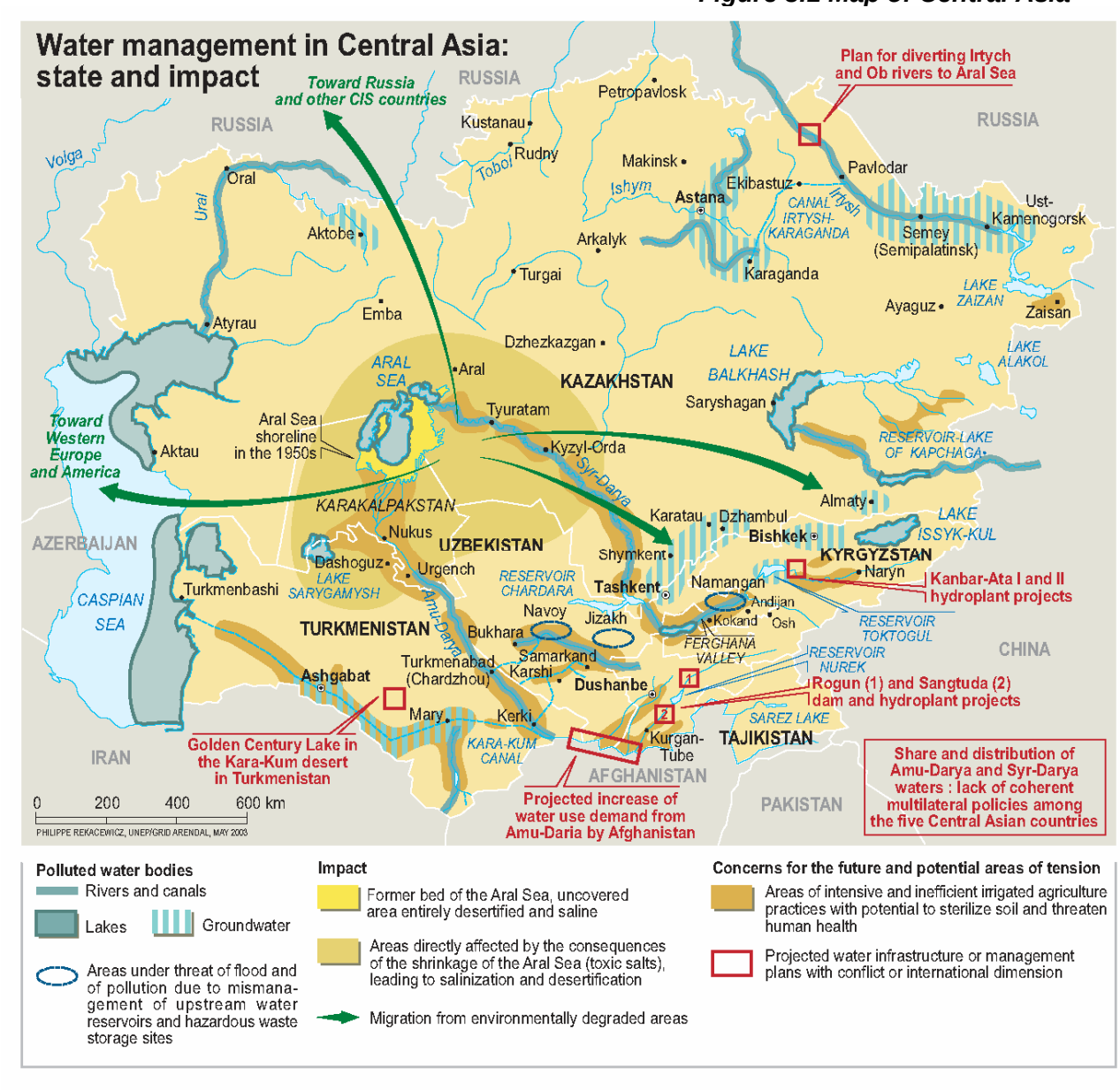
[4] 4 The HYDROMET Service of Central Asia (in Tashkent) has estimated the annual average water availability of 132km3 in the five countries, excluding Afghanistan. If to this is also added the water in lakes (120Km3), plus that held in storage in the snow, glacier and ice caps of Tien-Shan & Pamir (553km3), an additional 673km3 is found in the region.

[5] Although it may change in the future as a result of the climate change.

Uzbekistan which generates about 8% of the flow withdraws about 52% of the total water, followed by Turkmenistan 20% and Kazakhstan 10%. In addition water is used inefficiently.

With agriculture in the Central Asia almost entirely dependent on irrigation, access to water is of strategic importance. The region inherited huge irrigation schemes[6] and the associated storage and hydro-power dams built during the Soviet Union and managed centrally at that time. Once the Region split into five independent countries separated by state borders, the old agreements on water allocations, including the associated arrangements on supply of fossil fuel ("water for fuel swap"), came under great strain and could not be sustained.

Figure 3.1 Map of Central Asia



[6] Irrigation in Central Asia is wasteful. Water use is as high as 12,900 cubic meters/hectare and only 21% of this is effectively used. The remaining 79% is lost, most of it on the unlined on-farm and inter farm canals. This is comparable with the average losses of about 60% in most developing countries in other parts of the world.

As the upstream country (Kyrgyzstan) could not afford to import fossil fuels and started to increase winter discharges of water from the Toktogul dam to meet its winter power demand and reduce summer releases to accumulate water for the following winter, whereas the downstream countries (Uzbekistan and Kazakhstan) most needed water for agriculture during summer, the water – energy nexus[7] in the Syr-Darya river basin has become the source of the major regional problem[8]. Given the inefficiency of the Soviet built irrigation system and the geo-climatic features of the Region, the problem is one of technical capacity to deliver the required quantity of water and associated services to the water user (e.g. irrigation vs hydropower) at the time when it is required. It is therefore primarily a question of having appropriate infrastructure in place which can only be answered with massive national capital investment, both in the hydropower, irrigation and the municipal supply sectors.

There are also all the other associated weaknesses including poor institutional and inadequate technical capacity, which compound the problems. At the national level these issues can be addressed through the national EU Assistance. Many other Donors have recognised this and have moved their emphasis to national support (e.g. USAID, ADB, Swiss Cooperation, German government agencies, etc). Cooperation between the Central Asian countries on the allocation of water has been the main subject of various regional and bilateral negotiations and various international projects in the recent years, but apparently the key question remains unanswered - who pays and how, for the management and maintenance of those parts of the system that benefit more than one country. For reasons already well rehearsed and debated[9], water allocation among countries, i.e. at the regional scale from the flows of the transboundary rivers, is a divisive issue, which is grounded in political rivalries and regional competition, rather than in water availability as such. This has been confirmed from the comprehensive water resource and multi objective water allocation analyses by past TA projects (from the mid 1990's to 2004) financed from the USAID, ENVSEC, EC – WARMAP I, WARMAP II, WARMIS, WUFMAS, ASREWAM, as well as many other national and international academic studies. In a recent development (May 2007) illustrating the continuing political rivalries: "during the proceedings of the Shanghai Cooperation Organisation (SCO) summit held in Bishkek, Uzbek president Islam Karimov expressed worries over trans-boundary water issues. Consequently, he asked for guarantees that the construction of new hydroelectric stations will not disrupt established water-sharing practices – and that the interests of the downstream states (Uzbekistan, Kazakhstan and Turkmenistan) will be taken into consideration"[10] – as reported by the Central Asia-Caucuses Institute, John Hopkins University.

The analysis of the problem suggests that technical assistance to the region could approach the issue from an angle that sets aside divisions, but build on those aspects of consensus that are less likely to be disputed. This requires a move away from 'water' as a raw material for input to national agriculture and hydropower generation, to water in the environmental quality and hydrology of the region. From this perspective, water in all its other manifestations (water quality, preserving ecological habitat, human health, or agent for

[7] Water Energy Nexus, Improving Regional Cooperation in the Syr Darya Basin, World Bank, Washington, January 2004.

[8] Agreements for the release of water and exchange of electricity and fossil fuels proved ineffective and could not arrest the increasing power orientation of the Toktogul dam operation. The issue of compensating Kyrgyzstan for water storage services remained open, even when agreed summer discharges were made, supply of fossil fuels fell short of agreed quantities forcing Kyrgyzstan to increase winter discharges.

[9] SPECA report Strengthening Cooperation for Rational and Efficient Use of Water and Energy Resources in Central Asia, UN, NY, 2004.

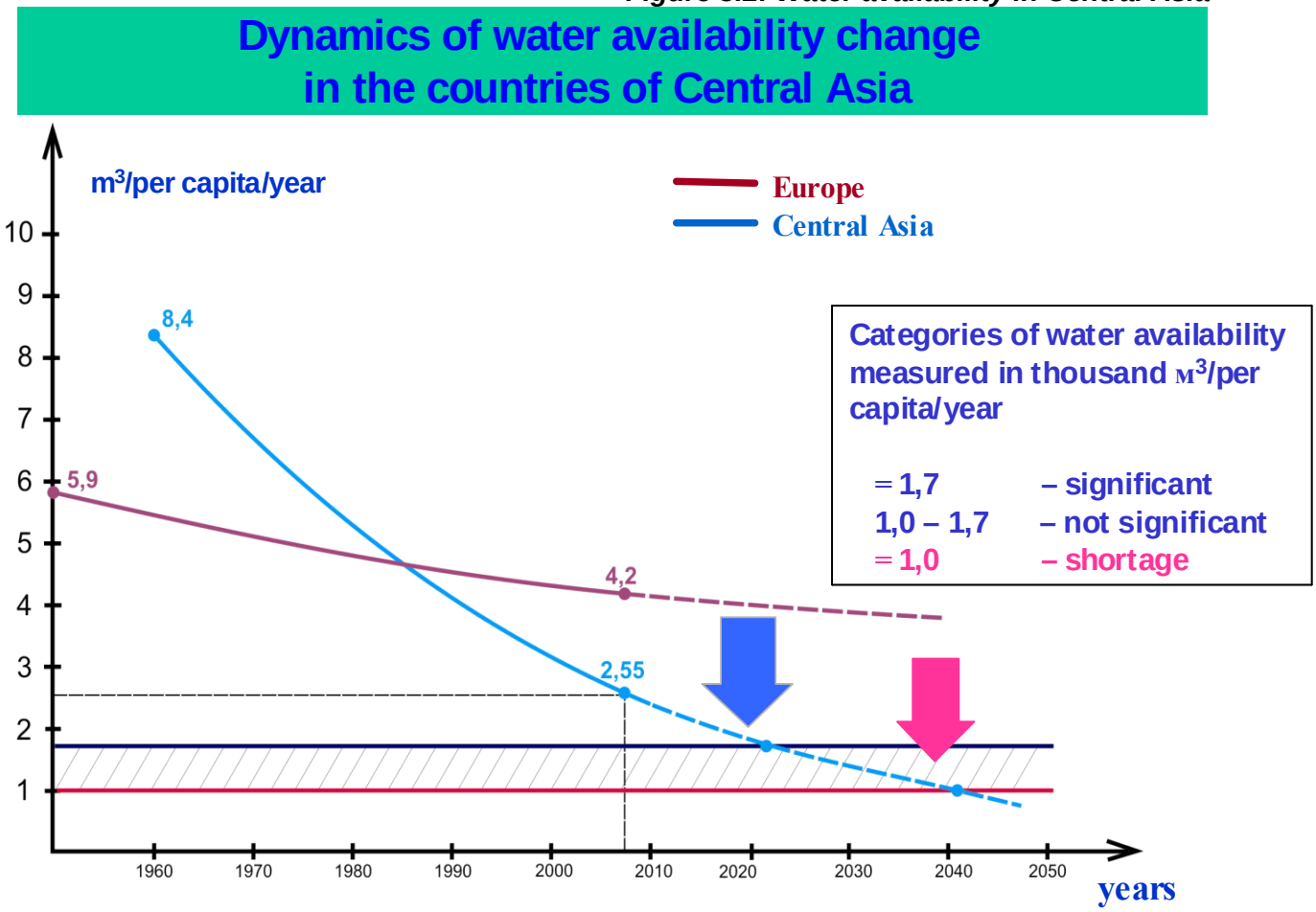
[10] 10 The commentary also notes that, "This intervention could be read as one of the series of moves designed to oppose Russian, Chinese, and Iranian plans in developing hydroelectric stations in Tajikistan. Tajikistan, the main winner in this economic plan, awaits considerable investment and solid future profits from these projects, including a much needed economic boost and the improved living conditions thereof".

destruction in flood, creating landslides) could be a matter for some level of regional cohesion, rather than confrontation.

A stimulus for regional cooperation could also be found if this manifestation of water is a force that is magnified in its intensity in the coming three to five years and beyond. In contrast to the well known problem of uneven distribution and allocation of water resources, discussed above, the problem of deteriorating water and environmental quality in transboundary rives, access to water and water availability, rising groundwater levels and water-logging have been underestimated, and this problem is not new. With the expansion of irrigated agriculture within the Syr Darya and Amu Darya basins during 1965 to 1985, the Soviets had to install collector-drainage networks to cope with the growing problems of rising groundwater levels, water logging and secondary salinisation. The increased irrigation return drainage flows into rivers substantially reduced water quality. The widespread use of mineral fertilizers and pesticides substantially contributed to the deterioration of water quality and land contamination by return flows from irrigated fields. The situation has not changed much from the Soviet period apart from the fact that water quality problems in the Region gained a strong trans-boundary dimension. The transboundary water basins between Kyrgyzstan, Tajikistan and Uzbekistan (Upper Syr Darya basin), between Tajikistan and Uzbekistan (Zeravshan river basin) and between Uzbekistan and Turkmenistan (lower Amu Darya basin) are especially problematic where water quality is also affected by discharges of municipal and industrial waste water. As the current economic, social and demographic challenges continue to pressure water resources and ecosystems, the failure to address water quality issues through integrated water resource management will result in the region continuing to develop along its current path adversely affecting both human population and the ecosystem as a whole. While many past projects in the region were mostly focused on water supply management, very few if any employed integrated transboundary water management approaches to address water quality problems through establishing environmental water quality objectives for the transboundary water bodies. Even though regional climate scenarios show uncertainty in their intensity, they can provide grounds for assessing the potential impacts of climate change and considering appropriate policies and measures. Most climatic projections suggest in the long run (by 2030 – 2050) high temperature increase in the Syr Darya Basin ranging from 3°C to 5°C (moderate scenario), and over 5°C - 6°C (worst case scenario) by the end of this century (Uzbekhydromet, Tajikhydromet). The long term impact of the climate change in Central Asia is likely to be a significant shortage of water resources associated with significant increases in surface air temperature (IPCC, 2001). Growing populations and high population density in areas like Fergana valley may exert increasing pressures on water availability and water quality.

The Fergana Valley is an example of the complexity of the water problems facing Central Asia, the simple technical difficulties and the political difficulties of balancing development, social and environmental objectives across three states. Growing populations and high population density in areas like Fergana Valley will exert increasing pressures on water availability and water quality (see figure 3.2). Overlying these demographic and poor management problems is the rapidly emerging impact of climate change, which could increase demand while at the same time as reducing resources. Even though regional climate scenarios show uncertainty in their intensity, they can provide grounds for assessing the potential impacts and considering appropriate policies and measures. Most climatic projections suggest, in the long run (by 2030 – 2050), high temperature increase in the Syr Darya Basin ranging from 3°C to 5°C (moderate scenario) and over 5-6°C (worst case scenario) by the end of this century (Uzbekhydromet, Tajikhydromet). The long-term impact of the climate change in Central Asia is likely to be a significant shortage of water resources associated with significant increases in surface air temperature.

Figure 3.2: Water availability in Central Asia



As the current economic, social and demographic and climatic challenges continue to pressure water resources and ecosystems, the region needs to address its water quantity and quality issues through an integrated water resource and river basin management approach.

The environmental pressures and treats on the Fergana are excellently summarised in the UNEP – GRID report[11] prepared under the umbrella of the OSCE ENVSEC (Environment and Security) initiative in 2005. These are categorised into three main groups:

- Access to and quality of natural resources (primarily water and land but also forest and biodiversity);
- Existing or potential pollution from industrial facilities, hazardous and radioactive waste sites;
- Cross-cutting issues such as natural disasters, climate change, public health environmental governance and public participation.

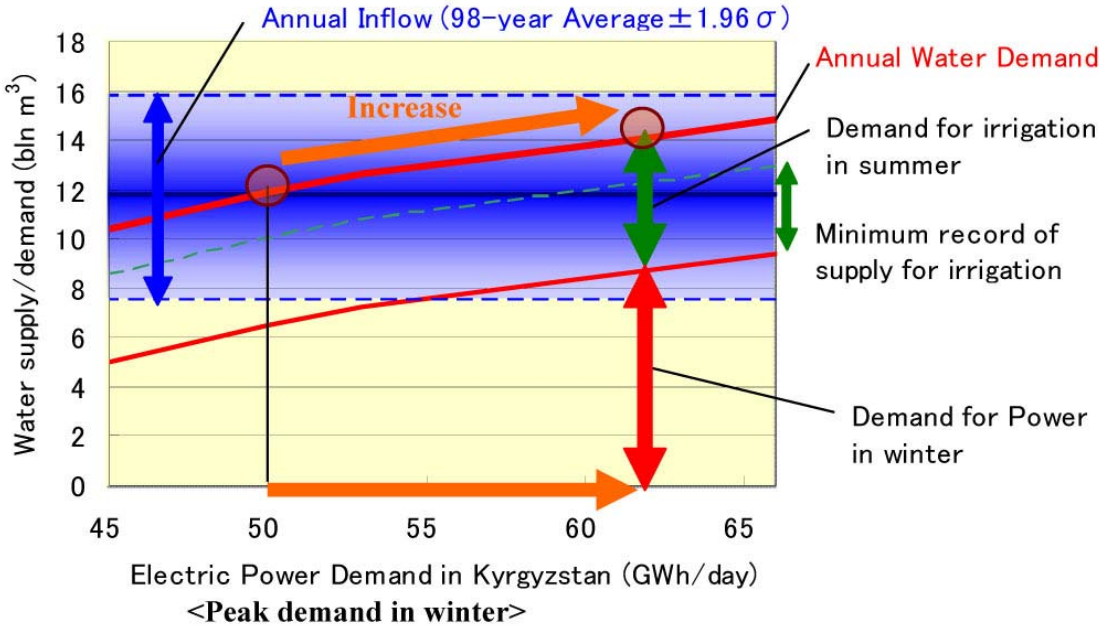
Of these issues, water resources and their governance is the most critical. There is competition for water resources throughout the region but it is manifest most fiercely in the Fergana Valley. A rapidly increasing population in the Valley and an increasing demand for water from a dominant cotton crop and the need for hydro-power in the upstream states, particularly Kyrgyzstan, has led to strained relations between the countries. The inter-relation

[11] Environment and Security – Transforming risks into cooperation (central Asia Fergana / Osh / Khujamd area) UNEP, UNDP, OSCE and NATO 2005.

between water and energy, the water-energy nexus, in Central Asia is well studied and at the heart of current water resource allocation challenges. The key challenge in the Fergana Valley is balancing the operation of the Toktogul reservoir in the Naryn River, in Kyrgyzstan, between irrigation supply and hydro-power where, since the break-up of the Soviet Union, demand circumstances have changed and the reservoir's importance as a power supply for Kyrgyzstan has greater importance. During the former Soviet era, when the Toktogul Reservoir was constructed, the upstream countries operated the reservoir for downstream irrigation supply and in compensation the downstream countries supplied fuel and electricity in winter to the upstream countries, thereby maintaining a regional balance. After the republics gained independence, this arrangement became increasingly more difficult to maintain as each republic gave way to its own interests and priorities. After the collapse of the Soviet Union, the five independent Central Asian countries concluded the Almaty Agreement in 1992, including a provision to maintain the same rules of water distribution as in the Soviet era. This agreement ignored the economic development of the two upstream countries, Kyrgyzstan and Tajikistan, and required the operation of Toktogul reservoir to remain as it was in the Soviet era, with irrigation given higher priority. In subsequent years, the weaknesses of the agreement have become apparent. Kyrgyzstan has been forced to operate Toktogul for power generation to protect their own interests and maintain energy security. This led to irrigation water shortage in two downstream countries in summer, while water released for power generation in winter caused floods in downstream areas. After the Syrdarya Framework Agreement was signed, Kyrgyzstan tried to negotiate with downstream countries for barter trade of energy but the coordination among the countries remains a daunting task. Uzbekistan sees the Syrdarya Agreement of 1998 as "still in force and it works", and has been absent from the agreement coordination meetings with other countries since 2003.

There are two peak outflows from Toktogul reservoir: one is for power generation in winter and the other for vegetation in summer. The inflow peak of snowmelt flow occurs around June and up until 1992, just after the republics gained independence, it was matched by the summer irrigation outflow. From 1993, the summer outflow reduced and the winter outflow increased with the summer and winter outflows reaching parity by 1997, since then the winter outflow became much larger; a tendency which has become very strong over the last five years. As discussed, the current operation of Toktogul Reservoir is closely linked with domestic electricity demand in Kyrgyzstan (including export of electricity). The Figure below, from a recent report by the Japanese International Cooperation Agency, shows the relationship of annual inflow (average and fluctuation range) and water demand, using electricity demand in Kyrgyzstan as a parameter to show general characteristics. The annual inflow is on average 12 billion m3. The sum of electricity demand in non-vegetation season and water demand in vegetation season is assumed to be annual water demand, since water demand for power generation in summer is lower than outflow for vegetation. The figure shows that average inflow and annual water demand curve cross at around 50 GWh/day of electricity demand. This means that long-term operation of the reservoir enables balancing inflow and supply if electricity demand is 50 GWh/day. Although this balance is not always achievable on an annual basis due to the fluctuations of inflow, because of the multi annual storage capacity of the reservoir the balance is normally kept with wet years compensating for drier years. However, electricity demand in Kyrgyzstan in recent years has increased and the peak demand in last winter was estimated to be more than 60 GWh/day. Alternative power sources are not readily available and therefore unless inflow increases by about 2 billion m3 there will be a severe shortage of water for summer irrigation in the future. This does not take into account the problem of long-term drought events and climate change, and does not account for ground water resources and other surface water resources.

Figure 3.3: Balance between Annual Inflow and Water Demand of Toktogul Reservoir



With the shift to power generation and increased winter releases has come the problem of flooding in the downstream countries of Uzbekistan and Kazakhstan, which alongside shortage of irrigation water is another political issue. The cost of the flooding is considerable and although mitigated to some extent by operation of the downstream reservoirs of Kayrakkum and Chardara there remains a lack of flood storage in the basin. An additional principal side effect of the releases from Toktogul during the non-vegetative period is the flows to natural Arnasay depression in Uzbekistan from the Chardara Reservoir on the Uzbek- Kazakh Border. Due to the prevailing frost in the winter months, the channel of the Syr Darya flowing out of the Chardara Reservoir has a limited capacity, resulting in a massive diversion of winter flows to the Arnasay depression, which renders these waters unusable for either irrigation or for replenishment of the Aral Sea. To overcome this situation, both Kazakhstan and Uzbekistan have committed to construct additional regulating reservoirs as a national security priority. Kazakhstan government is now constructing the Koksarai reservoir on the right bank, upstream of the flooding prone area. Construction began in 2008 and will be completed in 2012, and will not only reduce flood risks but also alleviate summer water shortages. On the demand side of the equation, SIC-ICWC predict that overall water demand in the Fergana Valley will increase by only a few percent by 2025 and, with improvements in water efficiency, irrigation demand should fall. The inefficient water use is a serious issue in the region. Water losses are estimated to be around 15% to 35%, mainly caused by the deterioration of facilities, with some irrigation systems suffering up to 40 percent losses from feeder and drainage canals. Rising ground waters and salination impede productivity and it is estimated that over the last decade 25% to 50% of all irrigated lands have been impacted. Water quality management, particularly management of salts and pesticides, is an important issue which has received the attention it deserves. The World Bank, Swiss Development Agency and Asian Development Bank are working with the Fergana countries to rehabilitate and enhance the irrigated lands but this is a slow process. The work carried out in the valley by the WB, SDC and USAID has been in the main with the Water User Associations and Federation of Water User Associations, setting up specific irrigation canal water Management Committees in conjunction with the administrative government at region level. This bottom-up approach has been successful both for canals in-country and to a lesser extent transboundary canals; however, it is not consistent with the commitment made by the countries under the Johannesburg commitment as part of IWRM to establish specific river basin councils. Therefore, in terms of the legal and institutional

framework, there is a disconnection between the bottom-up approach and the commitments under the Johannesburg process and to IWRM principles made at the national level. A common approach needs to be developed both within and between countries on the basis of existing legislation and institutional structures. In addition, donor support has focused almost exclusively on surface water resources and little or no attention has been paid to the groundwater resources in the Fergana Valley. The groundwater resources of the region have, to date, not been utilised to their full capacity. Most groundwater resources are used for drinking water purposes and not for irrigation. If one is able to significantly increase the use of groundwater resources also for irrigation purposes, it would reduce the pressure on water releases from Toktogul during the vegetation period, augment the river flow towards the Aral Sea, improve the overall quality of the surface waters and decrease the instances of waterlogging. It should also be acknowledged in the past that the environmental concerns have taken second place to economic development in addressing water resource allocation issues; the demands of the environment have been either overlooked or minimised. This attitude is changing and water quality and ecosystem health are being seen as important long-term issues, which must be balanced against economic development and under an IWRM framework; however, we should not be deluded into thinking that there will be an overnight conversion in attitudes. Water will remain to be treated as an economic good for some time and although the concepts and principles of IWRM and long-term natural resource management are welcomed by the countries and even reflected in legislation, in practice implementation will be gradual. The approximation to the Water Framework Directive, for example, should be seen as a long-term goal and one which can only be gradually approached. Economic development and social improvement will remain paramount to be tempered by environmental long-term concerns. As wealth is generated, the value system at local, national and regional level will change and the ‘value’ placed on the environment increase. The development of river basin plans is a key aspect of implementation of the Water Framework Directive and development a severe test of it’s practicality in the region. There are a number of projects which are looking to develop river basin plans.

4.0 Comments on Terms of Reference

The project's Terms of Reference required completion within 18 months, which given, the nature of the final deliverables, the drafting legislation/regulations and proposals for economic instruments for example, was unrealistic. To achieve its aim the Terms of Reference needed to been much more specific in its activities and, in each country to target a specific component of an already agreed Water Resource or IWRM strategy. As will be shown later in this report, none of the countries have as yet have meaningful, coherent, water resource or IWRM plans or strategies with the requisite financial government support. Ideally, the consultants should have been embedded with the beneficiaries working on specific aspects on a one-to-one basis; however, this was the exception rather than the rule. The team had a good close relationship with the beneficiary in Tajikistan and were developing an understanding in Kazakhstan but even here assistance was called for on an ad hoc basis – for instance the drafting of declaration on development of Irrigation Management Transfer and IWRM strategies for submission to the Tajik cabinet of ministers. The closest working relationship the project established was with the Executive Committee of IFAS were the team leader was made a member of the donor advisory group and provided commentary on the re-structuring of IFAS, the structure of a decision support system and development of the Aral Sea Basin Plan III. However, these were exceptions and much of the time the project team worked in isolation developing proposals and submitting them to the beneficiaries for consideration, which, in some cases, were taken up.

The countries are struggling to implement existing legislation, which is shown to be generally in line with the IWRM concept, due to a lack of financial support and resistant institutional frameworks. The Terms of Reference were too ambitious in the extent and the speed at which the Central Asian countries, which includes some of the world's poorest, can implement IWRM. It is unwise to encourage the countries to even try to re-establish the level of control and management which they exercised during the Soviet period, never mind more the sophisticated management structures and processes encompassed by IWRM, since they are simply not affordable.

Recognising and removing the hurdles to improve Governance with the long-term aim of IWRM should be a central objective of any follow on Water Governance project with targeted technical assistance over spread over a longer time period, reflecting country economic development.

It has become increasingly apparent during project implementation that the countries don't have a clear common understanding of IWRM and for that matter, neither do the donor organisations (see section 5.0). The countries are at different starting points and potential finishing points with regard to IWRM implementation and one size does not fit all, something which is not clearly stated in the Terms of Reference. In Kazakhstan, for example, the potential and resources are available to go a considerable way to full implementation of IWRM; however there are still many challenges ahead which are glossed over and not recognised by country or by the donors. There has been investment some areas, notably the Hydromet services, but there is a lack of financial support for the IWRM and Water Efficiency Plan developed in 2005. Institutional change is been slow, although in recent times there concentration of water responsibilities under the Ministry of Natural Resources which is encouraging (see Annex 1) In Kyrgyzstan and Tajikistan, focus has been on rehabilitation of the irrigation sector rather than the implementation of IWRM. Grass roots programmes led by the SDC, USAID, WB and ADB have been successful in establishing Water User Associations (WUA) and Federation of WUAs in the two countries, improving local water governance and water efficiency. Kyrgyzstan's progress is more advanced and through the national Water Management Improvement Project funded through the World Bank, it is tied securely to a national policy of Irrigation Management Transfer, a first tangible step of which

towards IWRM. There has been institutional re-structuring in Kyrgyzstan but it is not yet clear whether these changes will improve water resource management. However, they will not in themselves improve the water environment, which will require substantial financial and political commitment which is not evident. Tajikistan is following a similar development trajectory to Kyrgyzstan with the establishment of WUAs and in late 2009 a government declaration on development of an Irrigation Management Transfer Strategy and IWRM Strategy. In Turkmenistan the project determined that practical water resource management has not advanced to any degree since the break-up of the Soviet Union and perhaps has gone backwards in some areas. Implementation of the concept of IWRM is confined to the legislative framework. The establishment of WUAs and trialling of water efficiency and rehabilitation projects are targeted by the German government and UNDP-EC through their regional IWRM programmes and are seen as first steps to the reform in the irrigation sector.

Given the above, the workplans in the Terms of Reference were very loose and bore little relationship to the status of IWRM in the countries. At the start of the project only one country, Kyrgyzstan, had approved the project and had agreed the Terms of Reference and a lead beneficiary. It was not until six months into implementation of the project that the remaining three participating countries were ready to commit and communicate with the project team in drawing up work-plans. Even then, without a planning framework, the countries were unable to direct the team to specific activities where technical assistance was required and there was considerable overlap with the project and existing national projects which caused problems, particularly in Kyrgyzstan and were the project beneficiaries within countries were uncommunicative. It should be noted that these problems of project overlap did not occur with regional IWRM projects or, where they did, were quickly resolved. The project team was obliged to review the status in the key areas of legal and institutional frameworks, economics instruments and planning before it could make tentative proposals and ideas and present them to the governments. In the field of water quality management was the project able to make progress from the outset, supported by the EC funded project on Harmonisation of Water Quality standards and norms and executed by the Central Asian Regional Environment Centre (CAREC). In addition, good progress was made in the training (theme 5) and in the regional coordination activities (theme 6) and which proceeded without major delays, but these activities it should be noted were driven by the donors. In designing the next stages of a water governance support programme it is recommended that the EC discuss in much greater detail the workplans with each country inclusion into Terms of Reference, based on the findings of this present project, and not to assume that it can be done at the project implementation stage.

Although the Terms of Reference state the lead government beneficiary and main project partner during project implementation there was in a number of the participating countries open disagreement between the two which was to take the lead, causing delays in implementation. The lead project beneficiaries were either the Water Resource departments or committees, associated typically with the Ministry of Agriculture, or the Committees of Environmental Protection reporting to the Cabinet of Ministers, or in the case of Kazakhstan, the Ministry of Natural Resources. In whatever case, the project authors had been wise in making the other organisation the main project partner or second tier beneficiary, and creating a crucial linkage between key government stakeholders in IWRM implementation. However, in all countries, from the project's outset, it was clear that there was intense rivalry between the two management bodies. Fragmentation of the water sector is characteristic of the ex-soviet states and the lack of lateral coordination and collaboration between the responsible Ministries and Agencies. The individual ministries to have a clear understanding of their own mandates and are aware of the requirements in the legislation to coordinate and collaborate with the other responsible Ministries and Agencies, but in reality these requirements are not operationalised and there is no meaningful communication. Coordination and collaboration costs time and money and the Ministry staff, living off a minimal wage, have no incentive to put in the extra effort. On the contrary, the aim of lead

beneficiaries in some cases is to exclude not include the other beneficiaries and capture the project and it's funding. The stronger the beneficiary the more projects it can attract and the easier is it to exclude other Government stakeholders. This is pattern is apparent in many development projects and it is up to the donors to recognise this systemic problem and to guarantee wide beneficiary involvement.

Although the project did its best to resist, and to include other partners, it was constantly being forced to look at the problem from either a water resource issues or water quality perspective and not as a whole, as required by IWRM. The best balance was found to be in Kazakhstan where the project was able to work with both the Committee for Water Resources and the Ministry of Natural Resources, and other stakeholders such as the Hydro-meteorological services, albeit on separate tracks. Throughout implementation the project tried to ensure involvement of all the major government stakeholders, by inviting up to four government representatives to the steering committee meetings and training sessions in an effort to improve dialogue, however this had only limited success. It was hoped that the EC funded National Policy Dialogue (NPD) in Kyrgyzstan would act as a forum for improved sectoral coordination, but this was only a partial success and materialised towards the end of the project, again because of the lack of strategic national plan to which project activities could be attached (the IWRM NDPs for Tajikistan and Turkmenistan have not yet been established). It is recommended that the ToR for any follow-on Water Governance project be discussed in detail and agreed within the NDPs to ensure country buy-in and full stakeholder participation. The main project beneficiaries and their responsibilities should be clarified; perhaps multiple beneficiaries would be better than a lead beneficiary and project partners. If the project beneficiaries cannot be agreed coordination through the Cabinet of Ministers maybe an option.

A major project short-fall has been the non-participation of Uzbekistan. Without Uzbekistan, it has not been possible to establish a clear and full picture of the status of water resources and potential for IWRM implementation in the region. Any regional advancement can only take place with the involvement of Uzbekistan since there are downstream users on both the Syr Darya and Amu Darya and the relationship between Uzbekistan and the two upstream countries of Kyrgyzstan and Tajikistan is critical. Obtaining an acceptable balance between upstream hydro-power development and downstream social and cultural stability is at the heart of the 'water' problem of Central Asia is discussed at length and in depth in many reviews and texts. Proposing a way forward is a challenge which requires a deeper understanding of the Uzbek condition and objectives. The project's support to Uzbekistan was limited to support to a regional WB and World Meteorological Organisation event held Tashkent in October 2009 which brought together the hydro-meteorological organisations from six Central Asian countries, including Afghanistan, to discuss development and rehabilitation programmes.

On more practical issues, the Terms of Reference required the project team to undertake a pilot project (s) to test the Water Quality Standards System concept, which, because of the lack of baseline data, required in practice a monitoring programme of pilot sites. The lack of a baseline hadn't been foreseen in the ToR and no funds were made available in the incidental expenses to cover this activity. It was decided, early on in the project, to seek country approval to cancel required study tour in order to fund this monitoring. The total cost of the monitoring at the two pilot sites was approximately 50,000 euros. An addendum was issued to allow these costs to be covered by incidental expenses and a second addendum was necessary to transfer funds from local consultants' fee budget line to increase the incidental budget marginally. The Terms of Reference included for only long-term national experts, principally the national coordinators, whilst the project also needed short-term national experts to provide background studies and inputs into the pilot projects. This being the case, an addendum was requested and approved to transfer 650 long-term expert days to a new short-term budget line to cover these inputs.

5.0 Water Governance and IWRM

As discussed above, when embarking on this project, the project team did not know quite what to expect regarding implementation of IWRM in each of the participating countries. The challenge was to discover how the countries and the various actors within the sector interpret the concept of IWRM, how it fits within existing water governance frameworks and how it might be adapted to national and regional circumstances.

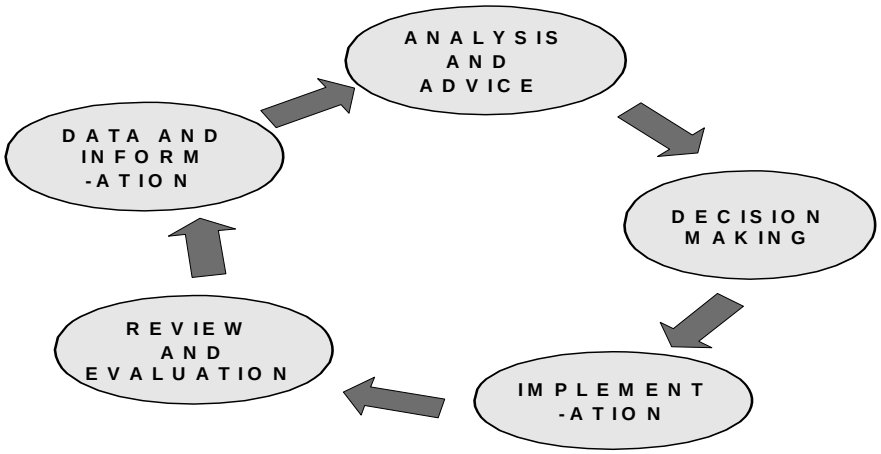
The central objective of the project was to promote good water governance and IWRM in the water sector. The two concepts are intertwined and they are difficult to segregate; however, they can, according to the definitions you adopt, be differentiated in terms of their scope and level of action.

Water Governance is the broader concept and is defined by Global Water Partnership (GWP) and later modified by the UN as being said to be:

'made up of a range of political, social, economic and administrative systems that are in place, which directly or indirectly affect the use, development and management of water resources and the delivery of water services at different levels of society. Governance systems determine who gets what water, when and how and decide who has the right to water and related services and benefits.' (UNESCO, 2006)

The components of a governance system are described in the generic policy cycle below (figure 5.4) and can be divided into three distinct processes: an analytical process (data and information, and analysis and advice) which determines the availability of water to users, a political process (decision making) which determines the 'rights' and needs of the various users at different levels (local, national regional and international) and a regulation process (implementation and review), ensuring delivery of agreed resources. The criticism that is often levelled is that water governance in the past was too focused on the analytical and regulatory aspect and too little attention to the mechanisms of decision making and given to its integration in a wider economic, social and cultural setting and that governance was principally centralised and top-down.

Figure 5.4: A generic policy cycle.



In defining good water governance four dimensions (Tropp 2005) may be identified in terms of usage;

- Equitable (social)
- Sustainable (environmental)
- Efficient (economic)
- Democratic (political)

From this definition of good governance we can see the natural progression to the three E's (economic efficiency, social equity and ecosystem sustainability) under-pinning IWRM.

'IWRM is a process which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems' (GWP 2000).

IWRM is the term given to what is now considered best practice in water management. Specific definitions have evolved over the 13 years since the Dublin Principles[12] were first put forward. At the Rio Conference later in the same year, six basic principles of IWRM[13] were presented and they provide a good founding in what is meant by IWRM:

- The river basin is the correct administrative unit for managing water.
- Water resources and the land which forms the river basin area must be integrated, in other words, planned and managed together.
- Social, economic and environmental factors must be integrated within water resources planning and management.
- Surface water and groundwater and the ecosystems through which they flow must be integrated within water resources planning and management.
- Public participation is necessary for effective water resources decision making.
- Transparency and accountability in water management decision making are necessary features of sound water resources planning and management.

IWRM is not intended as a strict set of rules that would apply around the world, but rather a flexible approach based on the above principles which can be adapted to the needs of the individual country.

IWRM is a Nirvana concept, that it is a vision of a horizon that an individual or society should be struggling to meet. Even if the likelihood of meeting the horizon is very low the moving towards that direction is seen as progress. It should be seen as a cyclical and long-term process. However in setting out towards the horizon the actors needs to be realistic about its future prospects and be aware that the cost/benefit of IWRM is not proven and although desirable the concept's implementation in terms of economic, social and environmental benefits cannot be clearly monetarised and will be shaped by many factors. The process is an expensive one and the benefits may not necessarily materialise, as evident in South Africa, where model water legislation has proved difficult to implement and the results in a

[12] The Dublin Principles arose from the International Conference on Water and the Environment in 1992.
[13] These principles evolved from the Dublin Principles at the Conference on Sustainable Development in Rio, also 1992.

number of respects has failed to meet expectations. The value of implementation of IWRM is tied to the value system of the country and no one size fits. Importantly the value of any IWRM process depends on the scientific information which underpins it and the decision framework in which it is embedded. Table 1 gives an example of how the key processes shows the changes being sought when moving towards IWRM.

Table 5.1: Transition to IWRM

	Movement towards IWRM →	
Responsibility	State Only	Shared by society
Planning	Sectoral	Coordinated / Fully integrated
Decision-making	Centralized and controlled	Shared process transparent negotiation and agreed actions

The concept of IWRM has grown out of advanced water resource management systems which have taken many years to develop and which are extremely well supported both financially and politically. IWRM assumes that the basic water resource management structures are in place and that they are operating effectively and integration is the barrier; this is not always the case. At its highest level, IWRM's aim is to reinforce the traditional analytical and regulatory approach to water resource management, by widening the involvement of the key actors and users at the local level, recognising the complexity and embeddedness of water use in a wider cultural and social context. The purpose being to reach a consensus regarding water use balanced between the economic, social and environmental objectives, recognising that each set of objectives is valid. This balance point is never static but changes with the aspirations and values of the society. Thus a poor nation will place emphasis on economic development objectives whilst richer nations may give more weight to environmental protection. In South Africa, for example, coming out of apartheid, it was the social development objectives encapsulated in the UN Millennium Goals which were the driver for the introduction and development of IWRM. The higher social and environmental objectives are very noble but they come at a cost, which can be considerable and cannot be discounted even in developed countries where financial resources are relatively abundant. As noted above, the benefits of IWRM are difficult to monetarise in particular the environmental benefits which are subjective and depend on society's value system and the level of economic development. It should also be recognised that IWRM in its full manifestation represents more than just good water resource house-keeping but increased democratisation, which may in some countries encounter resistance.

There is serious confusion between practitioners, donors and beneficiaries what IWRM encompasses and represents. IWRM is not simply integration of the analytical and management water functions, but, crucially, it is the widening and inclusiveness of the planning and decision making processes. The integration of management functions such as water allocation, pollution control, flood and drought management, monitoring, wetland management, comes historically under the heading of Master Planning, River Basin Planning or even Integrated River Basin Planning, with public participation or consultation typically an oblique activity. Depending on the persons discipline you ask, be they an engineer, institution expert, social scientist and environmental scientist, you get a slightly different meanings of IWRM and different emphasises. In Central Asia these differences are apparent in the type of project bearing the IWRM title, varying from the development of WUAs to mini-hydro pilot projects to River Basin planning to rural water supply. All these are very valid projects in their on right, but putting them under a common IWRM title makes inter government and inter project communication and collaboration very difficult. Under the IWRM umbrella there is no clear coherent planning process and development vision or strategy which the partners, donors and countries alike, can agree at either national or regional level. The process is

fragmented and elements are often captured by self interest groups and stakeholders particularly prevalent here in CA where the vertical alignment of institutions is so strong and engrained.

A common project misconception is that merely the creation of National Water Councils and River Basin Councils will bring about IWRM. However, if the knowledge of the water resource is weak, as in most of the Central Asian countries, any decisions such bodies may make will no validity and their role as decision making bodies questionable. As will be discussed later, current decision frameworks are vague and support systems are incomplete and not trusted, leading to decisions being made on arbitrary grounds. The creation simply of new management bodies at the top or bottom doesn't improve the situation. In addition, for IWRM concept is to operate effectively there needs to be good communications and working relations between local and central government, without them the introduction of IWRM can fragment further, and a 'gap' in management responsibilities develop and be exploited. These sort have problems have arisen with a number of the bottom-up projects targeted at establishment of Water User Associations in Kyrgyzstan and Tajikistan and when determining the responsibility management of the irrigation systems and operation of the water abstraction.

Without doubt the river basin is the natural planning unit and this needs to be recognised and introduced into all the Central Asian states. However, the degree to which it is feasible to decentralise water resource management to the basin level through River Basin Authorities as well as decision making through the RBC should be questioned. The cost of strengthening the current system at the central level is daunting enough but then to have to replicate this in eight, for example, river basins, seems an impossibility, especially in the smaller countries.funds, where finances and technical capacity are limited. It is suggested that fully formed RBM organisations are unnecessary in order to undertake planning at the basin level and the project would propose that in the smaller countries and in the first instance, that small operational River Basin Units be established strengthened by a single national technical unit located centrally.

Despite lack of definition the concept of IWRM is a very valuable concept, one in that it provides a common long-term vision, acknowledging the need for a cross-sectoral approach and widening of the decision making process and, probably most importantly in Central Asia, brings into the policy arena the need for sustainable development of water resources; something which has been consistently ignored in previous attempts.

Putting aside IWRM for an instant and looking at the more general concept good water governance and governance cycle, we most accept that the need to strengthen the analytical components of decision making cycle and is a pre-requisite for the introduction of IWRM. Although criticised in the past for over emphasis of a strong analytical component and ignoring the decision making component, but it is as unsound to go too far in the other direction and try to construct a decision framework without adequate analytical capacity – there has to be a balance. The question is which comes first the chicken (decision framework) or the egg (analytical system). The analysis system provides the knowledge base for decisions to be taken and sets the bounds of a decision framework, in which the decision making bodies can operate. In designing and establishing a cost effective analytical system a clear understanding needs to be established of the decisions that need to be supported at the local, national and regional level and not to provide superfluous facilities and capacity (see section 8.0).

The water resource management systems in the Central Asian states, like all those in the Commonwealth of Independent States, have suffered from a severe under-investment since the break-up of the Soviet and are shadows of their former selves. Design institutions have disappeared on all but paper and responsible ministries and agencies are operating on the

barest of budgets. The technical capacity has diminished and siege and survival mentalities have prevailed. Strengthening of the water management bodies is the priority in Central Asia, through re-equipping, training and technical assistance, and should undertaken in parallel with improved implementation of IWRM . However, it should not be done isolation but rather as a concerted effort, across the main government stakeholders so as not to distort or enforce institutional relationships, making change toward an integrated system less not more likely. The national programmes to strengthen one part of the water governance sector for example the hydro-meteorological service must take into account and not compete with support programmes for other agencies and Ministries whose regulatory mandate may overlap. Therefore before embarking on an improvement programme there should be a strategy which should also have at its heart at decision framework and process for institutional change to establish the enabling environment in the country to deliver improved governance.

These weaknesses will persist unless the Governments of Central Asia address the financing of these functions.

We are constantly reminded by the national governments that the management of water resources is a priority issue at both the national and regional levels, but with the exception of a few notable examples, including the new national environmental laboratory in Kazakhstan, there is little or no evidence that any of the countries are investing in its improvement. A telling fact is that in three of the four participating countries participating the drafting of the national water strategies have been supported wholly or in part by international donors. In addition, the investment programmes attached to the strategies (see section 10.0) indicate minimal commitment from the national budgets and there is a clear assumption that the international donor community will meet the costs.

As a result, at the current time we are seeing the aspirations of the donors and their policy and development objectives reflected in the water resource plans and strategies rather than those of the recipients. There is no rationale evaluation by the countries about what they can afford in the medium to long term and how far implementation of polices such as River Basin management and IWRM can be taken. We have to always remember that here we are dealing with some of the poorest countries in the World. Table 2 gives IMF estimates of GDP per capita on the five Central Asian States in 2009 and rankings out of 180 countries.

Table 5.2 : GDP figures for Central Asian GDP

	GDP per capita $	Ranking
Kazakhstan	6,875	68
Turkmenistan	3,489	100
Uzbekistan	1,093	134
Kyrgyzstan	872	145
Tajikistan	705	151

It is obvious from the above figures that the level of water resource management is going to be much less than that found in and advocated by the donor countries.

There is the need for an incremental and considered approach to the introduction of IWRM. They should not be swayed by the donor projects and objectives, even though it is recognised that it is difficult to resist donor leadership when there is no clear national vision in place. The is temptation for the poorer countries in particular to be overly ambitious, with the expectations and promises of external funding. What beneficiary is going to refuse a donor funded IWRM project, just because they know it cannot be implemented or sustained when for many officials these projects are their life blood, subsidising meagre government

salaries. Also there is also a clear onus on donors to coordinate and balance their projects into a cohesive and measured approach.

IWRM should not begin at the basin level with creation of River Basin Councils, as many projects have been designed, being remote from the central government decision making structures and where management integration is doubly difficult. The 2006 IWRM and Water Efficiency Strategy prepared by Kazakhstan is a case in point. One of first proposed steps in the strategy was to strengthen the eight River Basin Organisations with increased staff of up to 40 trained technical personal in each capable of undertaking comprehensive planning and management functions and to establish River Basin Councils. This ambitious strategy was estimated would cost $235 million over a four year period; to date the strategy remains in draft form and barely any of the interventions have been implemented. There has to be an assessment of what IWRM can deliver and to what level its feasible needs to be undertaken and a gradated introduction designed and followed

An IWRM strategy should contain the following building blocks to strengthen the governance cycle and the decision making process through introduction of IWRM principles:

- Water Resource status assessment (source yields, existing and forecast demands, surplus/deficits, water development options)
- Setting of environmental objectives and standards
- Development of Vision and Strategy
- Enabling projects – Policies, legislation, regulation and financing
- Institutional strengthening to deliver IWRM and change process
- Decision framework and decision support system
- Strengthening of monitoring and assessment programmes
- Licencing and permitting
- River Basin Management – integration of water management functions and planning
- IWRM implementation - increased stakeholder involvement in decision making at the administrative, basin, national and regional levels and cross-sectoral planning.

The above activities would not be planned sequential, but rather they would be undertaken in parallel in a balanced and measured progression. It is important that the IWRM is linked to a water resource assessment and that all proposed activities are costed and financial resources identified. As will be discussed in section 10.0 national IWRM plans should be complimentary and make clear reference to an over-arching regional plan.

6.0 Institutional Reform

A lack of institutional reform is the single biggest hurdle to the introduction of IWRM in Central Asia. An idealised structure and process is discussed in section 7.0 of this report, but here the Consultant would like to discuss the practical and human problems associated with institutional change. The process of change from Soviet central planning to IWRM will be a difficult one and it should not be assumed that it can be done quickly and in a single step. Policy declarations and legal reform although not without their challenges and delays are relatively straight-forward tasks compared with institutional reform, since it involves people and their complex inter-relationships. IWRM cannot be implemented and operationalised without full support of the water resource professionals and their clear understanding of the benefits and implications. In section 7.0 we put forward a model participatory process for the institutional change over a two year period however in this section we would like to explore some of the hurdles to change which might arise in such a process.

There is the need to look at the institutional change process from the perspective of the practitioners and not simply from above and through a two dimensional organogram. As discussed, the Central Asian states emerged with a Soviet system of water governance which was fragmented and decentralised, and where vertical communication predominated. Water was understood to be a common pool resource, a 'commodity', which was to be divided between competing users and that the environment was a tertiary concern. Planning was centralised and, if it can said to be so, integrated in Moscow under Ministry of Water Management (MinVodKhov) under a five year plan. There was a disjointed governance cycle and the regulating authorities, accept at the local level, were isolated from the planning process and from each other and operated in a system vacuum. Extensive hydro-meteorological monitoring programmes provided vast amounts of data and information, but they were not tuned to the needs of the regulators. The in depth analysis was undertaken by specialised institutes, now sadly much reduced, tied either to the hydro-meteorolgical services or the executing ministries. In Central Asia regulation and operation of the water resource was primarily the responsibility of the Ministry of Agriculture acting as both game-keeper and poacher. The system provided planning cohesion across Central Asia at the grand scale but failed to provide the tight control necessary for local regulation and planning. Following the break-up of the Soviet Union the regional planning capability was lost as the newly formed states competed for resources.

In the Central Asia states institutional structures can be said to have barely changed since the break-up, if not in their original form then certainly in their function. The legal frameworks have been revised and have taken on board the new concepts of IWRM and River Basin Management, but it most cases the new mandates have been applied to the old, existing institutional structures and cultures which, with perhaps the exception of Kazakhstan and more recently Kyrgyzstan, have persisted.

Institutional change is a response to a challenge/problem but if that challenge is not clearly understood then change becomes less attractive and existing institutions merely take on new functions with no coherence. It may be argued that this has been the case for IWRM and that there is no vision for its introduction and its slow rate of change is due to the persistence of old-style and dysfunctional institutions. The reason for persistence of these institutions is not only that they serve a specific known function, even if it is no longer relevant, but also that they may serve certain vested interests. When asking for change you have to persuade the people to relinquish a system that they know and are comfortable with, and, in troubled economic times, that can deliver of a form financial security, for a new system which is not proved and only holds out a tentative promise of better times – in other words better the devil you know. This institutional resistance to change may be strengthened by personal leadership styles and a cultural acceptance of hierarchal and authoritarian structures.

To overcome the barriers a campaign to establish an IWRM vision needs to be launched through parallel institutional change and planning processes, and key investment programmes. In this three pronged approach financial commitment by the government in the form of investment programmes is essential if the practitioners are to be convinced that the changes are achievable and are not just aspirations of the donors. Without this key assurance any changes imposed from above are unlikely to be sustainable. As discussed above, IWRM is a nirvana concept and its full implementation is unlikely even in the most developed of countries – although not often stated it is something people intuitively understand. Therefore the danger is to over-sell the concept. The Consultant recommends a step-wise approach to the introduction of IWRM and also in undertaking institutional change, which should be an evolutionary rather than a revolutionary process and should be driven be the practitioners rather than imposed from above by the politicians. The institutional change process should be part of a wider water resource/IWRM planning exercise which brings together the government stakeholders and develops mutual understanding of their functions and responsibilities. The process should be given time to mature and be professionally facilitated and, to a certain extent, dare we say it, choreographed – not led by the nose but guided. It should be underpinned by a technical capacity building programme in management as well as technical skills. However, for there to be a belief in a new vision and system, real financial commitment has to be there from the beginning and delivered when called upon; it unclear whether the Central Asian countries are yet ready to make such a commitment.

The following sections 7.0 to 12.0 describe the activities undertaken and conclusions reached by the project team in the six project themes.

7.0 Theme 1: Legal and Institutional Frameworks

7.1 Review of country water and environmental codes – common approaches and characteristics

7.1.1 Introduction

This Chapter does not replace the national reports prepared for each of the four countries on their legal and national institutional structures (see annex 1) but serves as a general overview of the legal foundations pertaining to water resource management found in the course of the project in the four project countries.

Amendments to the Water Codes and/or institutional reform will not, by themselves, transform the water sector to one that is governed by principles of IWRM. IWRM presupposes the existence of proper planning and management structures and processes for the different sectors. IWRM integrates these processes. The fundamental finding of the project was that there is no proper water governance in any of the Central Asian countries, or at the regional level. Prior to the integration of existing processes, there is a need to either develop sectoral capabilities and structures to be followed by or in parallel to the integration thereof or directly focus on an integrated water resource management process. The proposals presented in the context of this project have followed the second approach.

The Water Codes in the four countries are dissimilar. They do not follow a particular mode, but all were drafted from between 2003 and 2005. There are two Codes that have formally adopted IWRM principles (Kazakhstan and the Kyrgyz Republic) and there two Codes that are non-IWRM (Tajikistan and Turkmenistan). The Environmental Codes, by and large, do not address IWRM water issues, apart from the Kazakh which introduces IPPC. One cannot therefore compare between the two types of Water Codes or draw any common conclusions therefrom. That is also the reason that the Consultant was asked to prepare separate national reports on the legal and institutional structure in each of the four countries.

There are however certain general comments that may be made in this context, as follows:

7.1. 2: Water as a Resource or as a Production Tool

Water is considered in Central Asia as a commodity and a production tool. This is first and foremost a Soviet legacy but also an economic necessity in at least three of the project countries (agriculture and/or hydropower respectively). The massive diversion of waters for agricultural development in Central Asia that took place between in the years 1950-1980 is but one example of the Soviet legacy, proven to be counterproductive, as the Aral Sea disaster and the deterioration of water and land in the lower reaches of the Basin demonstrates. The economic necessity stems from the predominance of the agricultural sector in the project countries and the need to continue providing the farmers with cheap large quantities of water to sustain their way of life.

Apart from the Kyrgyz Republic the countries do not view water as a natural resource to be managed sustainably. The Kyrgyz view water as a resource in support of their position that water is to be treated similar to other natural resources to be exploited and not one deserving of protection.

The viewing of water as a production tool is apparent from the structure and content of the Water Codes in all four countries. In all Codes, including those which are seen as IWRM ones, there are lengthy and very detailed chapters and provisions on the different types of use of water (irrigation, domestic, health, mineral, recreation, mining, fisheries, industrial etc.

etc.), which could be summarized in a much simpler form by introducing general principles rather that the elaboration employed. The environment is not identified as a user. It is the Consultant's sense that this may stem also, but not only, from a drafting style prevalent in CAR which requires very detailed provisions in primary legislation (as in common-law countries) rather than the concise drafting style dominant in the roman-dutch legal systems.

In order to transform to IWRM the emphasis of the legislation has to shift from usages to sustainable resource management. Some of the issues that an IWRM Code has to regulate are detailed below. The Code has to regulate planning, including the planning unit (basin), the content of the plan (water, land, population, economic activities etc.) the legal force of plans, integration of plans prepared by different sectors, participants in planning processes and the manner in which plans are prepared and approved. The Codes will have to introduce a mechanism through which the water resource managers will have the responsibility and power to determine the long-term and annual safe yields from all natural water resources, to determine environmental flows and other environmental allowances, to allocate waters, in terms of quantity and quality to users, including to the environment and to determine the price therefore. The allocation of water should cease to be a technical exercise on the basis of outdated Soviet water usage norms for various crops and be transformed to a decision on availability of water and the most beneficial use that can be derived therefrom. The water resource manager should be charged to determine the value of water for various uses thereby contributing to a national dialogue on water usages in the Country. It should be clear, for example, from the Water Code that not all waters are to be allocated. The retention of water in their natural environment will contribute to their quality as well and such should be within the powers of the water resource managers. Furthermore the law has to determine the manner in which the existing or new institutions manage the resource, the coordination between them or the integration between the institutions, not only in practical questions such as licensing but also for the more fundamental management decisions as elaborated above. The law has also to determine mechanisms of public participation in the planning and decisions making processes. Only where legislation includes these, and additional, elements one can envisage the transformation of the water sector to one managed according to IWRM principles.

7.1.3 Operation of Irrigation Infrastructure

The legal review shows that in all four countries the operation of the irrigation infrastructure, at least of the main canals and the off-farm canals is carried out by the water authorities, with varying degrees of separation between the operational functions and resource management.

The Kazakh and Kyrgyz Water Codes assign the operational functions to the water authorities. In Tajikistan and Turkmenistan such is done in secondary legislation which details the functions of the water ministries. There is an attempt in three out of the four countries to separate water operation from water resource management. In the Kazakh Code operation and resource management are done by (separate) sub-divisions of the Committee on Water Resources, one organized along administrative boundaries and the other along basin lines. In the 2005 Kyrgyz Code both functions are assigned to the State Water Administration, a body not yet formed, although in November 2009 the Government decreed to separate between operation and management, to be carried out by the Irrigation Institute and water resource management by the Agency of Water Resources, both to be incorporated (separately) in a newly formed Ministry of Natural Resources. Reorganization is still in progress the final structures have not yet been declared, yet the separation between operation and management seems to be entrenched under the new structure. In Tajikistan a process of separating the functions has been initiated but not yet implemented.

The Consultant would see a possible role of the water authorities in the irrigation sector, as the Regulator for the supplying agencies. It is envisaged that the operational functions will

not be carried out in the long-term by the government itself, but that it be transferred under a Irrigation Management Transfer programme from government to privately operated starting initially at the Water User Association level. Given the importance of the irrigation to the economy and its (natural) monopolistic character the Consultant would recommend the assignment of a regulatory function to the water authorities when the government itself ceases to operate the system.

In order to entrench the separation between operational and water resource management functions it is recommended that the Water Codes and/or ministerial regulations delete these functions from the list of functions assigned to the water authorities in their respective countries.

7.1.4 Water Resource Management Functions

Integrated Water Resource Management (IWRM) is first and foremost, as explained, a process of integrating existing planning and management. It assumes that there is a coherent water resources management in place.

The Water Codes do not always support this. The focusing of the Codes on water uses replaces basic management functions. None of the Codes assigns the basic management functions to the water authorities. Apart from a stipulation in the Kyrgyz Code the body responsible for water management is not required to prepare water resource plans. In none of the Codes is there a requirement for the determination of annual safe yields for the water resources annual water allocations to be made.

In addition to the absence of annual water planning mechanism water use does not always require a license. While in all countries special water use (i.e. water that is abstracted by mechanical means) requires a license, in practice such water licenses are rarely issued. Since the Ministries responsible for water are the bodies responsible for issuing licenses for special water use for irrigation and also operate the systems (see 9.1.3), the special water use license loses much of its relevance. In fact in discussions in one of the countries the Consultant was advised that the allocations were done on the basis of availability and demand, initially without restriction, and later in the season, upon reduction in the flow, some form of rationing or prioritization would be decided upon within the water establishment. Thus, in practice, there is no annual water allocation per user but only a division between the users based upon the available water. Such is not commensurate with a national or regional water planning scheme, based on resource availability.

The solution of the above may not lie solely in the amendment of water legislation and its strengthening towards a much more regulated water allocation and use regime (including for water quality issues) but more in its implementation. The problem seems to be in the lack of real incentives for water saving by the large amounts of water available and used in the region. However IWRM cannot be instituted with a strong regulatory regime that controls the availability, allocation, use and ultimately discharge of water.

7.1.5 Water Sector Responsibility and Decision Processes

While in all Codes there is a general stipulation (with different levels of strength) as to the responsibility of a certain state body for the water resources of the country an in-depth review of the Codes will show that in most cases this is not backed by practical provisions on the extent of responsibility. In fact, despite the general statement, in none of the countries there is a single body with overall responsibility for the water sector. The responsibility is, generally, divided between the water, environmental, health and geological authorities, with each of them bearing responsibility for their own sector and without anyone having overall or even coordinating responsibility. Only the Kyrgyz Water Code prescribes the establishment

of a National Water Council with a coordinating function between the different stakeholders of the water sector, but which in fact has not commenced functioning. In practice, in all countries, coordination between the agencies at the national policy level, to the extent exercised, is done at the Cabinet level only.

Two notable exceptions exist to the above rule in most of the Codes. In some cases one of the state bodies is charged with certain decisions (issuance of licenses for example) but is required to coordinate its decisions with one or more of the other bodies. The second exception is at the local level. It appears in many cases that the decisions at the local level are taken by the territorial sub-division of one of the bodies following consultation with all of the other bodies to arrive at a coordinated decision.

It appears however that some coordination exists on the end-product, i.e. on the permit or license, but not in the initial stages where policy decisions are made. In essence the decision making process at that level is and remains to a large degree a vertical one with each agency obtaining its own, uncoordinated, decisions from the political powers. In a notable instance a sector reorganization proposal was presented by one agency to the Cabinet following an internal preparation process within that agency, but without having consulted with even one single agency outside of it. When asking about this the Consultant was advised that coordination should, and would take place at the cabinet level.

In order to obtain a sound water management decision process the Consultant would recommend that the Water Codes be amended by including the following two principles (a) that one body, preferably with jurisdictions over all aspects of water resources (an integrated water resource agency), be formally assigned responsibility for all aspects of water resource management; and (b) that inter-agency consultation, coordination and agreement be required for all decision affecting other ministries or agencies, including policy decisions.

7.1.6 Water Quantity and Water Quality and the Integration between them

All Water Codes deal both with water quality and water quantity issues, by referring to the use (quantity) and protection (quality) of the water resource. As mentioned before there is no statutory mechanism for the determination of safe (sustainable) yields and the allocation of water resources on the basis thereof. In terms of quality the Soviet water quality classification system is still in place and claims to be used (in Kazakhstan and Kyrgyzstan at least) but its use is severely hampered by a diminished monitoring capacity. The Water Codes and procedures set ambient water standards in terms of Maximum Permissible Concentrations (PDKs). However there is no connection made in any of the laws between river flow and ambient quality through the mechanism of coordinated abstraction and discharge planning involving both the water (quantity) and the environmental (quality) authorities. While at least one of the Water Codes requires some coordination in the issuing of abstraction and discharge licenses, this is done at a local level and is not applied in river basin or land use planning.

The integration of water quantity and water quality is pivotal to IWRM and needs to be undertaken at both institutional (coordinated or integrated institutions) and statutory levels. The Water Codes need amending to ensure that all water resource use planning and allocations take into account the impact on water quality, and vice versa that all discharges take into account their effect on water uses at the point of discharge and downstream.

7.1.7 Surface and Ground water and their Integration

The prevailing position in the region is that surface and groundwater are separate and distinctly managed, one by the water authorities and the other by the geological authorities. There is a sense, at least in discussion with the geological experts that the groundwater resources, even the shallow ones, are viewed as a mining resource rather than as an integral part of the water cycle. The Consultant has therefore been advised in some cases that the ground water resources have to be managed separately from the surface waters.

The Consultant disagrees. Ground and surface waters, apart from deep fossil aquifers should be considered as a unitary whole and managed jointly. Establishing the inter-connectivity between SW and GW sources is an important element is any higher water resource management strategy, not only for the maximisation of yields but also management of WQ and environmental protection. To that end the Consultant recommends that the Water Codes be amended to transfer the responsibility for ground water resource management from the geological to the water authorities. Such is statutorily required, though not implemented in the Kyrgyz Republic and exists to a certain extent also in Tajikistan and Kazakhstan. However as with quantity and quality the responsibility is at the practical managerial level in the issuance of licenses and permits. The recommendation is that the integration will be done also at the institutional and policy level.

7.1.8 River Basin Management

Kazakhstan has divided the country into eight rivers basins and assigned pursuant to its Water Code River Basin Administrations for their management. The Kyrgyz Code calls for the delineation of river basins and the nomination of River basin Administrations and River Basin Councils but such has not yet been implemented. The Tajik and Turkmen Codes do not include specific references to basin management or administration, part from general language that could be interpreted as permitting also basin management, apart from territorial (i.e. non-basin) management.

The Consultant queries whether the resources available in expertise and resources would enable the countries to engage in actual river basin management and planning. The Consultant recommends therefore that the three countries that have not yet adopted river basin planning make an assessment of their capacity and their actual needs before engaging to full river basin management. It may be that an optimal solution would be to form river basins which would serve as the planning and management unit but without, at this stage nominating institutional structures for their management at the basin level but to operate them through the national structures.

In any event river basin management needs to be introduced through legislation and in this respect the Consultant recommends that the Tajik and Turkmen Codes be amended to allow using the river basin or river sub-basin as the planning and management unit.

7.1. 9 River Basin Councils

Similar to the river basin management also in the case of River Basin Councils a single functioning RBC exists only in Kazakhstan. While the Kyrgyz Code calls for the establishment for RBCs they have not been constituted since also river basins have not yet been declared. The Tajik and Turkmen legislation does not call for the formation of River Basin Councils.

The Consultant has produced his recommendations for the Kazakh RBCs and would recommend a similar structure, role and financing for RBCs in all project countries. It is

further the recommendation of the Consultant that the RBCs be constituted regardless of the formation of RBAs as a public participation tool for the planning and management of the water resources in the basins.

However, to be effective the RBCs need good support and encouragement in their early years. Once it is firmly established and develops its own confidence, they should become indispensable tools in water management.

There remain several aspects of the establishment, make up and functions of the RBCs which are discussed frequently in stakeholder meetings:

- **how water users may be represented on the RBC**. For example, it is important for rural domestic water users to be represented but there is no association available to them to affect representation.

- **how the costs of operating the RBC may be met**. Costs for meetings, travel, consumables, etc. are difficult for many of the members of the RBC to afford. Certainly the government should be financing them at least until they are well established, whether through the RBO or through local budgets.

- **whether the RBC should be an advisory body**. This is how it is defined in the Water Code, but some insist that it should be a decision making body and the RBO obliged to follow its decisions.

- **the chairmanship of the RBC.** In the Water Code the RBC is stated to be chaired by the Director of the RBO. Some consider this a conflict of interest. Another problem is the relatively low position the Director of the RBO holds within government service compared with, say, an Akim.

These are all legitimate concerns and need to be carefully considered and answered.

7.2 An Idealized Institutional Structure for Water Resource Management

In order to arrive at IWRM the Consultant recommends that institutional changes be introduced in the current governmental structure, as follows:

Phase 1 Separate between Operational and Regulatory Aspects of the water authorities

Phase 2 Form an Integrated Water Resource Agency (IWRA)

Phase 2A Consolidate all water monitoring aspects (M&A) under single monitoring and analysis service under IWRA

Phase 3 Establish River Basin Administrations and River Basin Councils (including river basin M&A services)

Phase 1 – Separate between Operational and Regulatory Aspects of the water authorities

At present the water authorities in all countries both manage and regulate the nations' water resource and at the same time operate the off-farm irrigation infrastructure. For reasons explained in the country reports the Consultant recommends to separate between these two functions, as partially already accomplished in Kazakhstan (figure 7.1) and scheduled in the near future for the Kyrgyz Republic (figure 7.2)

Both the Kyrgyz and Kazakh model retain however both the operational and regulatory functions under the auspices of a single body, the Ministry of Natural Resources in the Kyrgyz case and the Committee of Water Resources in the Kazakh one. The difference between the two separation models is that the separation in the Kazakh case is geographical as water resource management is basin based through Basin Administrations and operational departments are oblast (not-basin) based while the Kyrgyz model has two separate agencies at the national level (the agency for water resources and the irrigation institute) both under a non-water specific ministry, the Ministry of Natural Resources.

Fig. 7.1 – Separation between operation and management – Kazakhstan

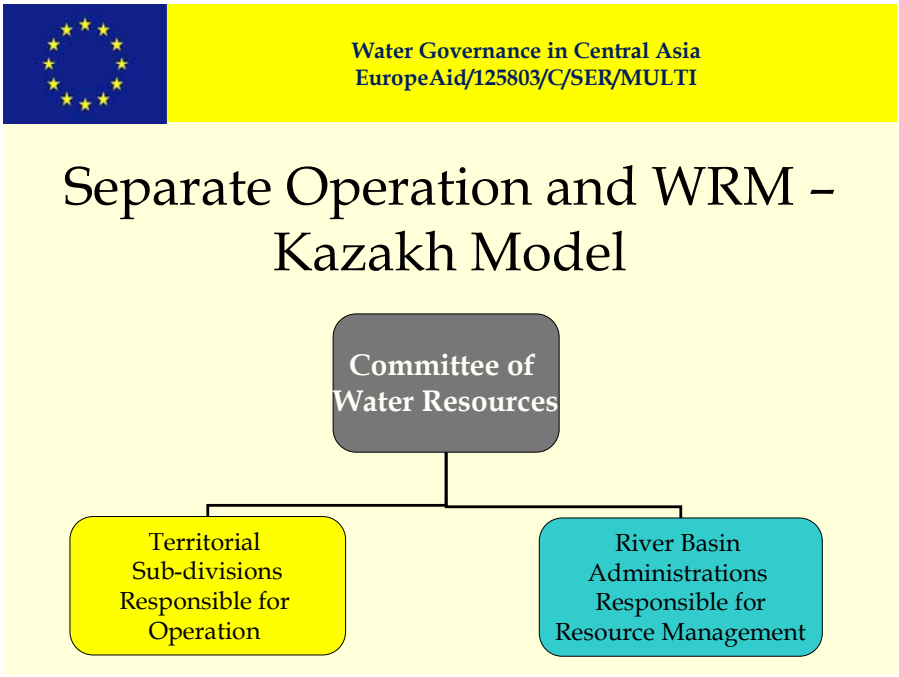
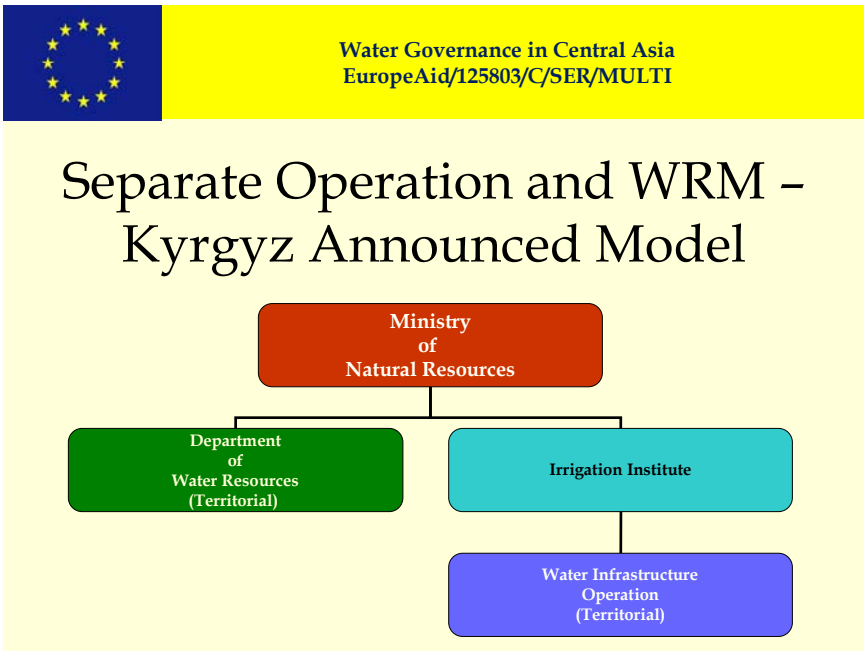
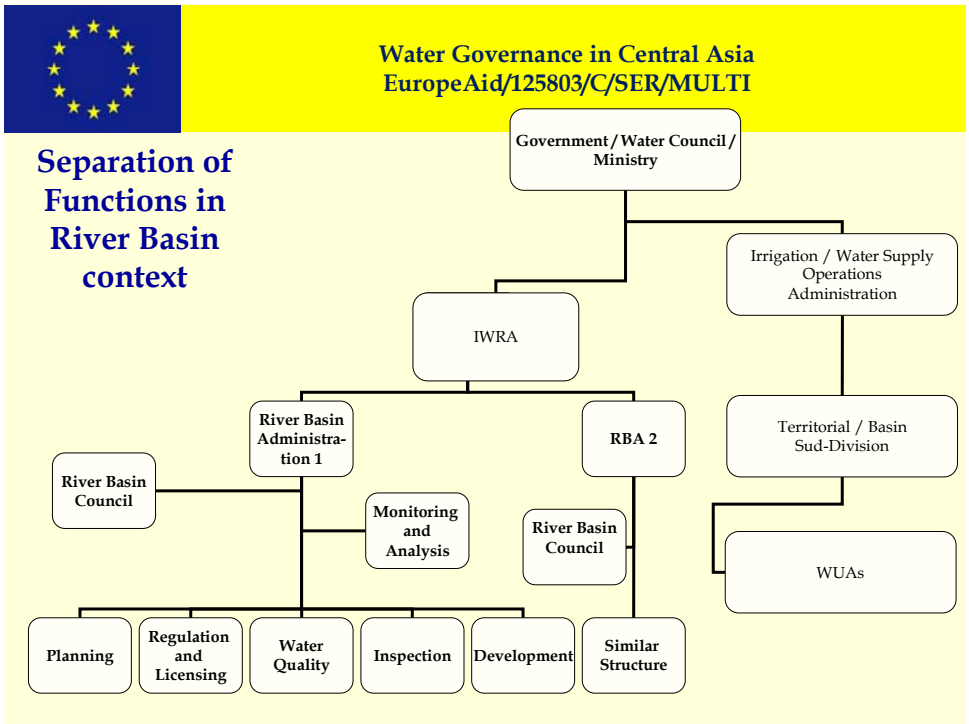


Fig.7.2 – Separation between operation and management – Kyrgyz Republic



In the idealized model the separation is both at the national and the sub-national level and the two functions are not connected. As shown in figure 7.3 in the idealized structure there is no connection between water resource management and operational departments.

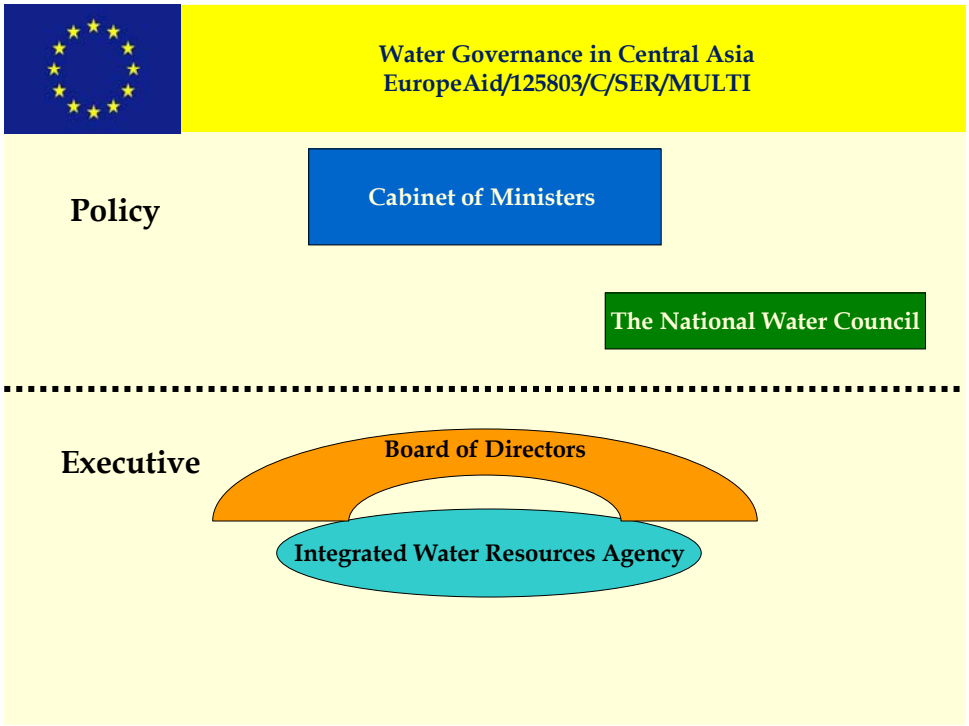
Fig. 7.3 – Separation of Functions – proposed structure



Phase 2 – Form an Integrated Water Resource Agency (IWRA)

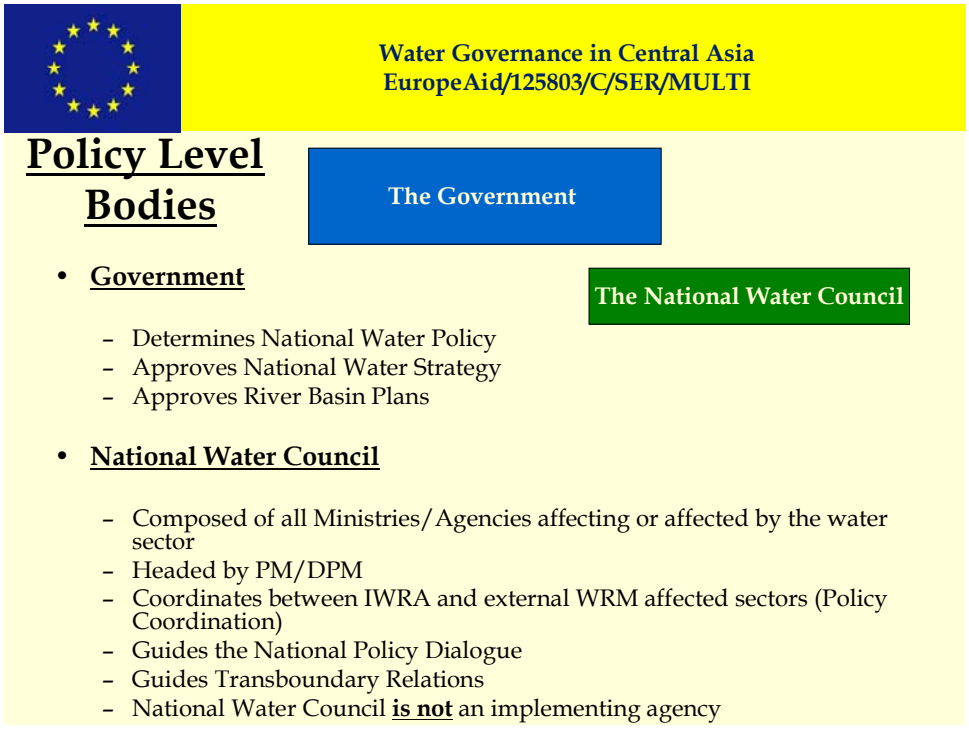
While the needs of integrating decisions could be accomplished through the coordination of the planning and management functions, the Consultant is concerned that the prevailing governance culture in the Central Asian countries, which characterized by a vertical decision making process, is not conducive to coordinated structures. The Consultant therefore proposes, as the idealized structure for the implementation of integrated water resource management, the formation of a single agency, whether in the form of a Ministry, Agency of Commission, but directly reporting to the Cabinet of Ministers, with overall responsibility for water resources management, the Integrated Water Resource Agency (the "IWRA" or the "Agency"). The Agency, which should be newly formed and not based on an existing body should be composed of those departments from the various ministries that have sectoral responsibility for water resources, such as the Water authorities with respect to surface water quantities, the Environmental authorities for surface water quality and the Geological authorities on ground waters. Fig 7.4 shows a possible structure of the Agency, possibly to be overseen by a Board of Directors composed of senior representatives of those Ministries and Agencies that transfer departments and functions to the new Agency. The IWRA would be an executive agency charged with all the responsibilities pertaining to water resource management, protection and development. At the political level the IWRA will be subject to the Cabinet of Ministers and directed by an organ thereof, a National Water Council.

Fig. 7.4 – The Agency and its oversight bodies



The Cabinet of Ministers exercises policy level oversight over the Agency. The National Water Council is a Cabinet level committee composed of all Ministers and heads of Agencies that have a connection to the Water Sector, such as resource managers, water users and the economic Ministries. The Water Council serves as the extension of the Cabinet for the determination of water sector policy and sector coordination and portrays the importance attached to the water sector by the Government. Examples of functions of the policy level are depicted in Fig. 7.5.

Fig. 7.5 - Functions of Policy Level Bodies



The IWRA is, as described, a new agency responsible for all aspects of water resource management. The Agency will have all functions hitherto exercised by other agencies such as the water, environmental and geological authorities in their respective areas. As in other countries it is proposed to retain the water related functions of SanEpid (i.e. drinking water quality) with the Ministry of Health and not to transfer these to the new Agency.

The functions of the Agency include inter alia

- Planning, management, protection and development of the water resources (Ground and Surface, Quantity and Quality)
- Responsibility for the protection of the resource from any impact on the resource
- Representation of the country in transboundary relations
- Issuing Abstraction and Discharge licenses from and into Natural Resource

The Consultant recommends that the Agency be overseen by a Board of Directors. As shown in Fig 7.6. below the Board of Directors would be composed of senior representatives of those Ministries and Agencies that transferred departments or functions to the IWRA. Its functions are oversight over the Agency and the determination of its operating policy. While the Consultant is aware that a Board of Directors for a governmental agency is not part of the ordinary structure prevalent in the Central Asian Countries, the idea in perhaps a different form could be useful. In the formation of the new Agency there is a danger that certain outlooks unique to the transferring agency(ies) will disappear in the process. The Board of Directors will serve as an additional foundation for the creation of a real integrated agency.

Fig. 7.6 – The Board of Directors of the Agency

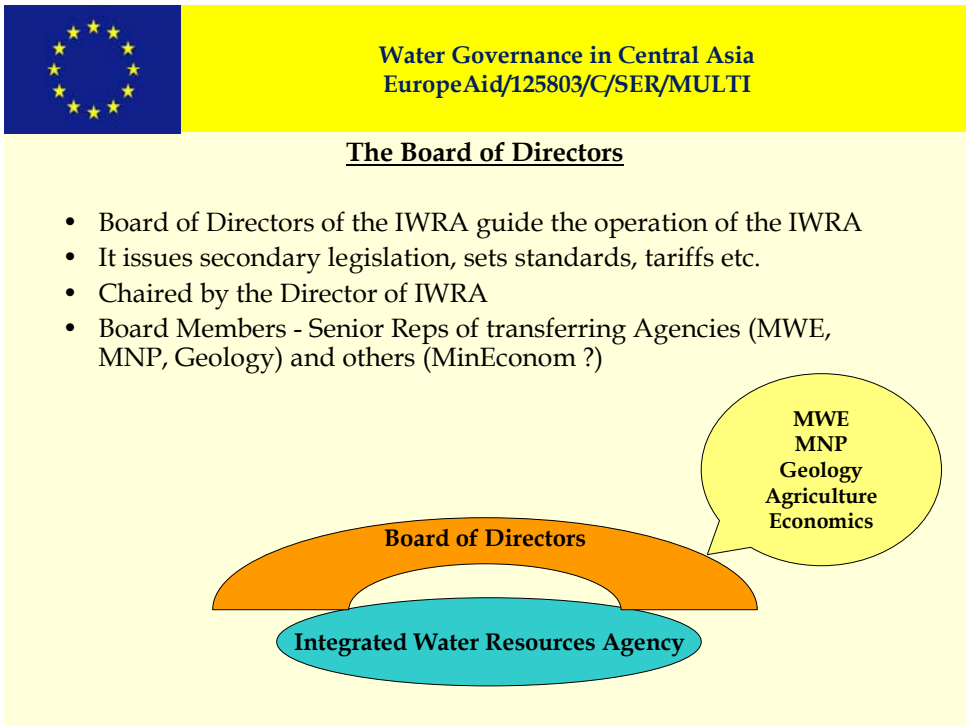
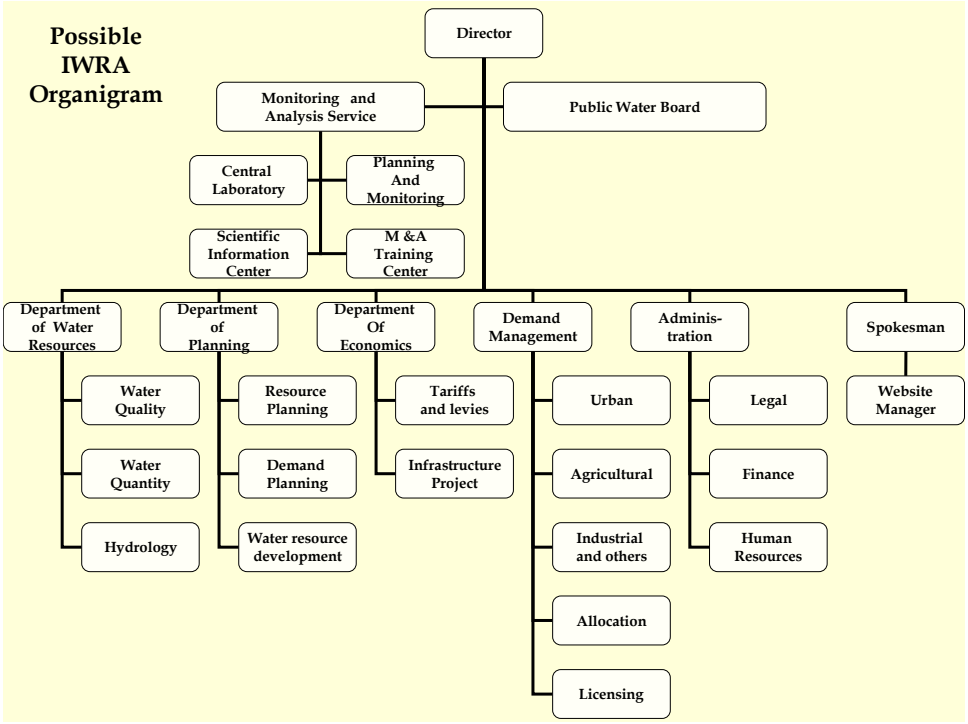


Fig. 7.7 depicts a possible Organogram of the Agency, incorporating the functions to be carried out by it

Fig. 7.7 – Organogram of idealised IWRA

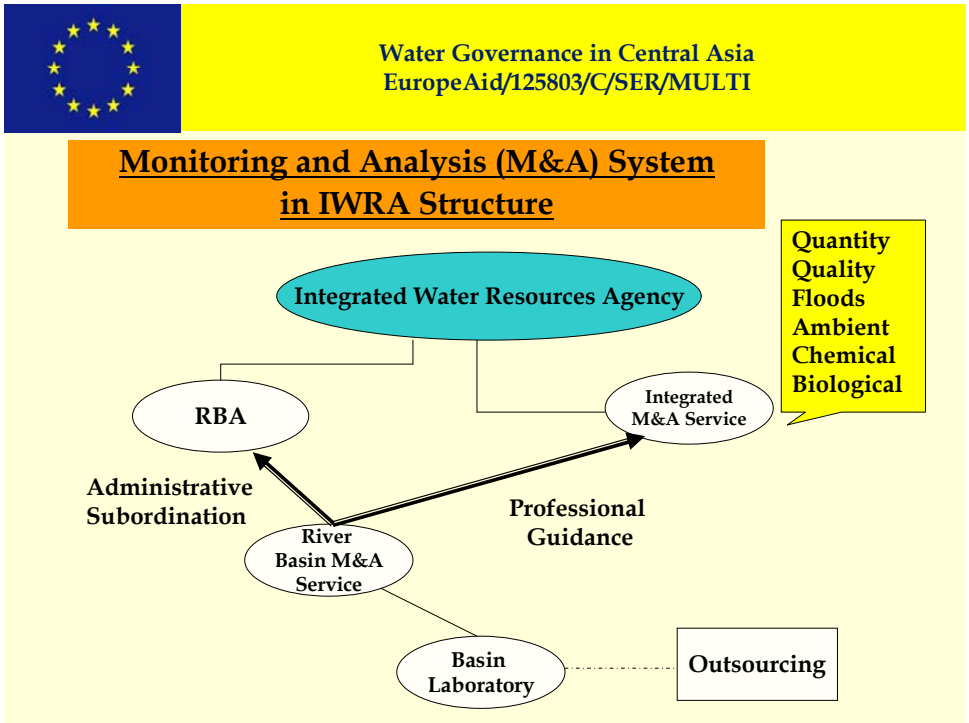


Phase 2A – Consolidate all water monitoring aspects (M&A) under single monitoring and analysis service under IWRA

The integration of the planning and management functions under the roof of a single Agency the IWRA needs to be augmented by the creation of a strong, in-house monitoring and analysis capability. At present these functions are carried out by a multitude of institutions that include the Hydrometeorological Services as well as the water, environment, geological and SanEpid authorities. There is only limited coordination between these bodies and no exchange of information takes place, they are under-funded and understaffed, and in the case of the Hydrometeorological services its primary function and financing is for its meteorological services, not for hydrological ones. At present, the Consultant gets a general sense from the region that the monitoring agencies should continue to undertake their existing functions the best of their ability, as determined many years ago, without regard to the needs of their users.

The Consultant recommends therefore that all water resource monitoring aspects be transferred to a water resource Monitoring & Analysis Service (the "MAS") that will be part of the IWRA. The MAS will, as shown in Fig. 9.7 above, serve as the advisor to the Director of the Agency for scientific matters while at the same time responsible for all water resources related monitoring and analysis activities, which will be primarily carried out at the basin level as shown in Fig. 9.8. By incorporated within the Agency, M&A activities will serve the actual needs of the Agency while the MAS by serving as the scientific advisor to the Director will allow it to improve on the M&A activities performed.

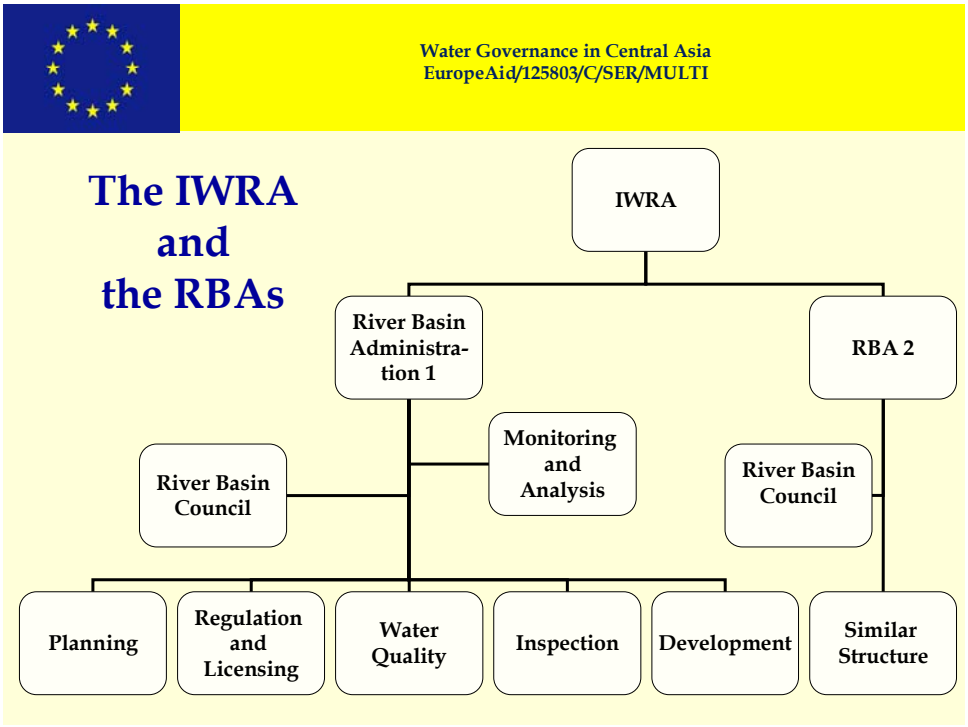
Fig 7.8. – The Monitoring and Analysis System



Phase 3 – Establish River Basin Administrations and River Basin Councils (including river basin M&A services)

The final phase in the institutional changes towards IWRM requires the establishment of river basin structures. Such has to be preceded by the formation of river basin (or river sub-basin) districts.

Fig. 7.9 – River Basin Administrations (RBA)

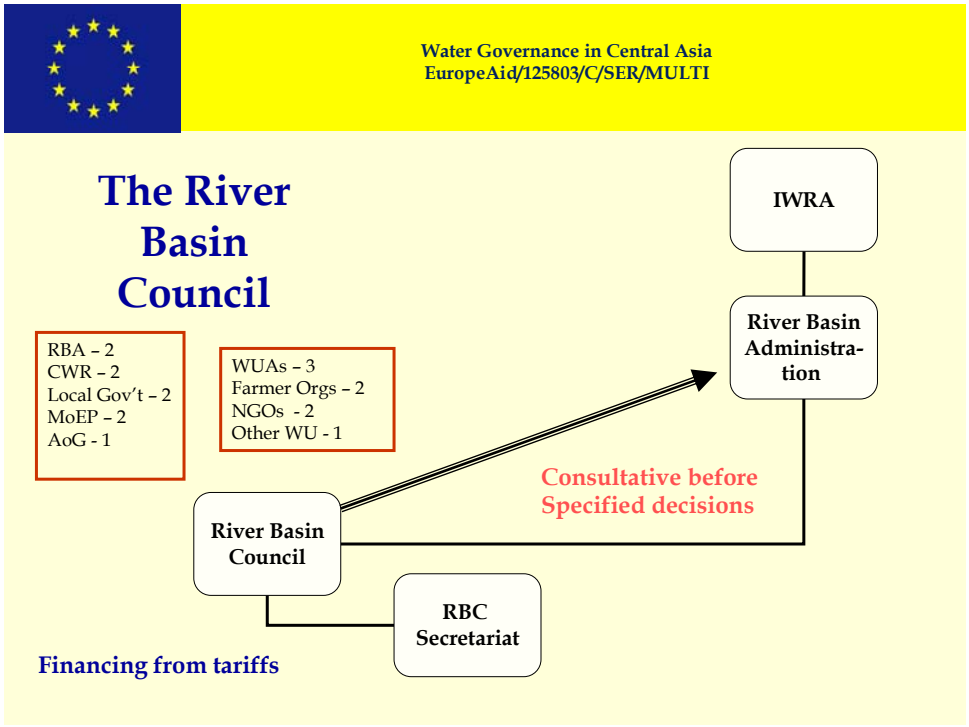


The proposed structure would call for the establishment of a River Basin Administration which is the local arm of the IWRM and which would perform all water resource management functions at the basin level.

A structure of the RBA and its departments is depicted in Fig.7.9 below. Please note that the RBA Director has, as its advisor, the basin level MAS, as described in Figs. 7.7 and 7.8 above.

In addition to the RBAs the Consultant recommends the formation of River Basin Councils (RBCs). While the Johannesburg Declaration call for management of the river basins by RBCs the Consultant recommends that such not be introduced at this time as it appears that neither the government nor the non-government stakeholders are prepared for a non governmental management of water resources. The RBCs would therefore be consultative organs, composed of government and non-government stakeholders, headed by the Director of the RBA. However, in order for the consultative status of the RBC to have significance it is proposed that the RBC is to be consulted on a range of specific matters that are under the jurisdiction of the RBA, prior to the RBA taking that decision. The structure of the RBC with a possible composition (small majority for government) and its relation to the RBA are shown in fig. 7.10. The RBC is financed through tariffs and could have a small secretariat for the benefit of the non-governmental members of the RBC.

Fig. 7.10 – The River Basin Council and its relation to the RBA



7.3 Institutional change process

Introduction

The introduction of institutional changes towards the adoption of IWRM cannot be achieved overnight as discussed in section 5.0 of this report. Both the introduction of IWRM as the basis for water sector management well as the building of institutions that will support the process is an evolutionary process. In the chapter on the idealized institutional structure for water resource management we proposed three main steps towards institutional change, as follows:

Phase 1 – separate between Operational and Regulatory Aspects of the water authorities
Phase 2 – Form an Integrated Water Resource Agency (IWRA) with a single monitoring and analysis service
Phase 3 – Establish River Basin Administrations and River Basin Councils (including river basin M&A services)

This chapter will discuss the means towards the adopting of the structure.

Pre-conditions

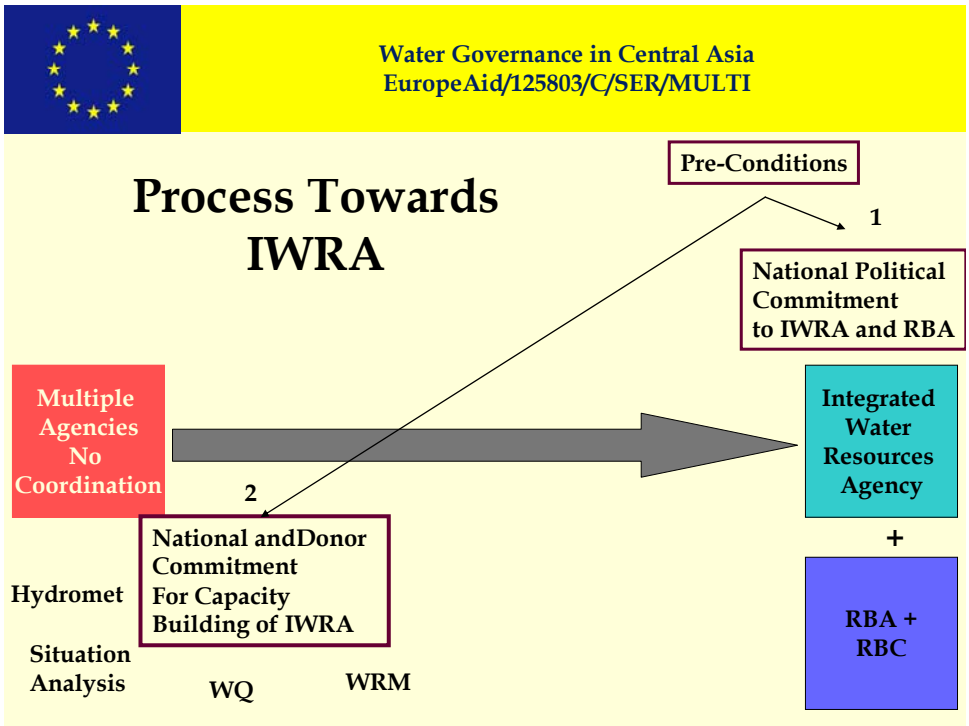
There are two pre-conditions for succeeding in making an institutional change, i.e. a strong and lasting political and financial commitment towards the change and capacity building of the new institutions.

The first pre-condition requires that the highest political levels of the beneficiary countries agree, at the least each for their country, but preferably also as a whole, that water resources be managed in an integrated manner. Without such support the process is doomed. The political support needs to express itself not only in suitable proclamations, important by themselves as the expression of the political will, but also in the allocation of sufficient funds for IWRM, and not only from donor funds but, primarily, from the national budgets and the usage of suitable economic instruments including, at the minimum, full-cost recovery for water supplied and its dedication for IWRM.

In addition, the political will has to express itself in the recognition that water is not a mere production tool but, first and foremost, a natural resource to be managed in a sustainable manner for the benefit of present and future generations. The political will may have to express itself in the break-up of long-serving establishments such as the water – agricultural one with its interest in cheap (if not altogether free) water in an unlimited quantity. The political will is also to establish a clear time framework for implementation.

Capacity building is the second perquisite for success. The idealized institutional structure calls for the establishment of a new Agency which although composed of departments from various existing institutions, will not be an extension of an existing agency but a brand new one. It is a desire that the new Agency will not be dominated by one interest (quantity or quality for example) but that it will truly integrate all aspects of water resource management. The Consultant believes that by forming a new Agency should not be understaffed (and under-funded) as the current water resource and environmental agencies are in most countries are its staff should be properly versed and trained in modern water resource management practices - requiring a joint commitment of the country and the donor-community. Both need to be involved in the appropriate capacity building and both need to be fully committed to allocating the needed resources (financial and human) to that end.

Fig.7.11 – Pre-Conditions



As Fig. 7.11 shows an arrow leading from a non-coordinated multi-agency structure (the current structure) to a coordinated one and depicts the two pre-conditions for the process. Only if the pre-conditions are guaranteed the process towards the formation of the new institutions, i.e. the IWRA, MAS and RBAs/RBCs, can commence. Without these the Consultant would not recommend entering into the process.

A Timeframe

The first step towards the institutional restructuring is by setting a timeframe. The timeframe is important as it sets on the one hand boundaries for completion of procedures which are lengthier than those currently employed in implementing institutional changes in the CAR and at the same time allow a sufficient time to work out all of the details of the change and its consequences.

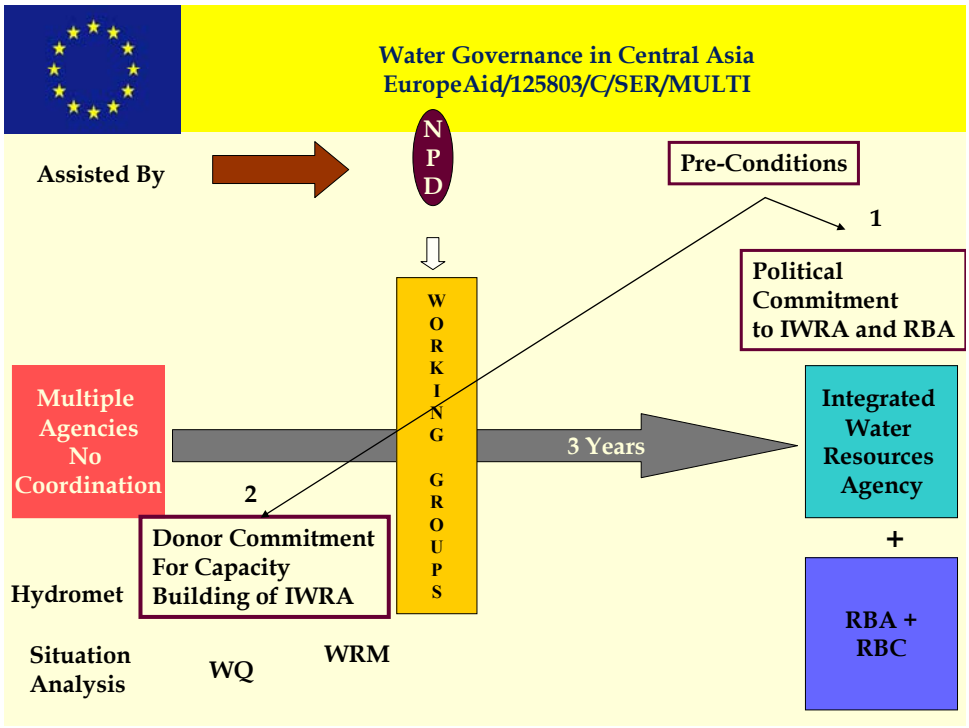
The Consultant recommends that the timeframe be in the order of three years, i.e. that upon the completion of three years from the decision to restructure the new institutional structure be in place. If appropriate, the National Policy Dialogue established by UNECE and funded by the EC in each country (see below) could have a role in setting the timeframe and guiding the process.

National Policy Dialogue Process

It is suggested that the structure of the new bodies and their functions could be discussed developed by an institutional setting that is a combination of the National Policy Dialogue (NPD) and Working Groups (WG) whose tasks will be to define the composition, functions, responsibilities and requisite funding of the new institutions.

The NPD would be the senior oversight body for a process that will involve a number of Working Groups to work out the details for the transformation towards institutional changes. The NPD would meet at least every quarter and discuss, recommend and decide where appropriate on the new structure. The NPD will appoint the WGs which will prepare the actual proposals and the discussions of the NPD will be primarily based on the WGs reports. The NPD is to include all stakeholders affecting or affected by the water sector and it should not be dominated by a single ministry as is, in some cases, the situation today. The NPD would be sponsored by and receive advice from the donor community, although the chairmanship of the NPD is to be a nomination of the national government, perhaps the proposed head of the new Agency.

Fig 7.12: depicting the institutional change process



The Working Groups

The WGs headed by senior members of the NPD and comprise technical experts from the Government and other stakeholders, nominated by the Government. The WGs will be an integral part of the NPD and will develop the institutional restructuring details. The WGs will meet on a continual and ongoing basis and issue reports in their various fields of competence to the NPD.

It is recommended that WGs be established for the following areas, at the least–

Organizational and Integration to develop the Organigram and decision framework/decision support system

Legal to develop the changes to primary and secondary legislation necessitated by the institutional restructuring

River Basins to develop institutional proposals for river basin management basin level.

Financial to identify the financial needs of and sources for new Agency

M&A to develop the structure, functions and capacity of the new MAS.

Capacity building to direct and oversee the capacity building programme

As discussed above this institutional change process (fig 9.12) would be undertaken in parallel with national water resource planning process.

Capacity Building

In parallel to the process of building the new institutional structure a process of capacity building, sponsored and carried out by the donor community has to take place. The capacity building will involve at the technical training in all aspects of water resource management, including IWRM, water resource planning and water quality monitoring and analysis, as well as more general management training.

7.4 River Basin Councils in Kazakhstan

Introduction

Out of the four project countries only Kazakhstan has established basin based water resource management, the so-called River Basin Administrations. Kazakhstan has been divided into eight river basins which follow the hydrological contours which are different from boundaries of the territorial-administrative oblasts and has appointed a River Basin Administration (RBA) for each of these river basins. The competence and functions of the RBA are detailed in Article of 40 the 2003 Water Code. Articles 40 and 43 are reproduced in Appendix 'A' hereto

In addition to the RBAs the Water Code, in Article 43, called for the establishment of River Basin Councils (RBCs) for each of the river basins. The Consultant has been advised that some of the RBCs were indeed established but that the only functioning one is the RBC for the Balkhash – Irtish River Basin. Donor support has been quoted as reason for the functioning of the Balkhash-Irtish RBC.

Characteristics of the River Basin Council (RBC)

The Kazakh RBC is different from its namesake the RBC as devised by the Johannesburg Declaration. It is not a management body but an advisory one. River basin management is carried out by the government appointed RBA which is composed of employees of the Committee of Water Resources of the Ministry of Agriculture (CWR). The membership of the RBC, pursuant to the Water Code is an open one and in discussion with the Chairperson of the Balkhash-Irtish RBC the Consultant was advised that the membership of the RBC was still open to additional participants, a notion of an open ended body.

Article 43 defines the role of the RBC as an advisory one, but apart from the approval of basin agreements, which in essence deal with the rehabilitation of certain parts of a river basin, there are no specific roles for the RBC. The RBC is therefore a body where general questions pertaining to the river basin are discussed, but with actual impact on the workings of the government. The fact is also that the RBC is headed, by law, by the head of the RBA and in such loose structure the matters to be discussed are essentially those that the governmental representatives would like to address.

The RBCs are not financed by the Government. As such the non-government members thereof have to rely on other funding sources and are also most likely to lack the resources for independent evaluation of the activities in the River Basin.

Recommendations

The Consultant recommends that that the RBCs will become more institutionalized than is presently the case. The institutionalization is to encompass the membership, facilities, role and financing of the RBC, as follows:

Membership

It is proposed that the membership of the RBC be structured to include both specific Governmental and non-governmental representatives, creating a situation whereby the RBC is a realistic representation of the river basin stakeholders.

A possible membership could be as follows:

Government members		**Non-government members**	
River Basin Administration	2	WUAs or WUA Federations	3
Committee of Water Resources	1	Community groups	2
Hydromet	1	NGOs	2
Local Government	2	Other Water Users	1
Ministry of Environmental Protection	2		
Agency of Geology	1		
Total	**9**		**8**

Total membership of RBC would therefore be 17 with a one-person majority for the Government on the one but a large minority of non-government members to demonstrate the representative composition of the RBC. The chairman would, as stipulated in the Water Code be the head of the RBA. One may consider one of the non-governmental members as deputy.

An additional benefit of the structure of the RBC is that it incorporates members of all agencies involved in IWRM thereby invoking an institutionalized integrative consultative process at the basin level.

Neither the Governmental nor the Non-governmental members of the RBC will be employed by it nor is the membership to be considered a full time occupation. The representatives to the RBC will participate in meetings and perhaps dedicate some additional time thereto and a financing mechanism for that will be discussed further below.

Facilities

The RBC lacks any formal facilities that would allow the non-governmental members to fulfil their functions. If one desires a meaningful functioning of the RBC these members need access to data, workspace, a meeting place with stakeholders, a small research capacity, etc. While in the western world these functions can be carried out by the NGOs the situation in the CAR is different and not all NGOs have the financial capabilities. It is therefore proposed to consider the establishment of a small permanent secretariat to coordinate the work of the RBC and to assist the non-governmental members in their tasks. The employees of the secretariat themselves will not be members of the RBC.

Role

The role of the RBC is advisory. The Water Code does not describe on what matters the advice of the RBC is to be sought. The absence of a clear definition of the role of the RBC affects its effectiveness.

It is recommended to alter the current situation, by describing in the Water Code certain instances where the advice of the RBC is to be sought prior to the adopting of a particular resolution by the RBA. The ultimate decision on the matter will not be transferred to the RBC

but will remain with the RBA. The RBA will however be required, by law, to consult with the RBC although since it is a consultative process only it will not have to accept its recommendations. The responsibility for river basin management will remain with the RBA. The benefit of the consultation with the RBC is to formalize a public participation process where the RBA will have to explain its decisions while affording the opportunity to the public represented by the non-government members of the RBC to express their position as well.

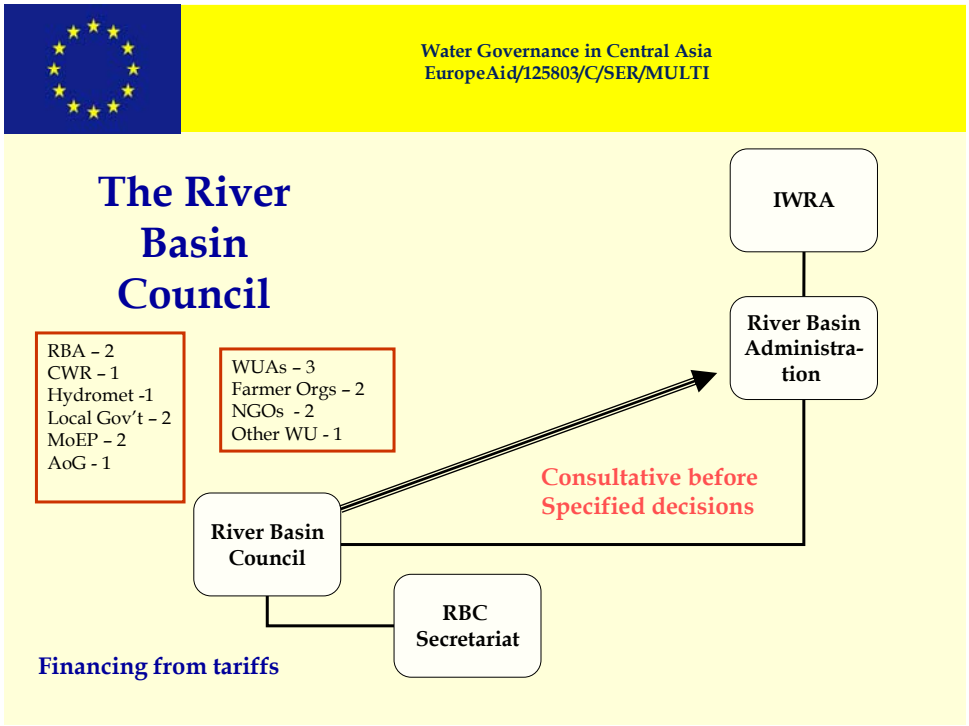
Financing

The RBCs are at present not financed by the government and the only functioning RBC operates on the basis of donor funding. The need for donor funding demonstrates, the view of the Consultant that the operation of the RBCs is insufficiently high on the priorities of the Government and lacks genuine commitment to IWRM.

The Consultant believes that the RBCs should be financed from water tariffs. While consultant is aware of the legal constraints on earmarking of income pursuant to Kazakh legislation the Consultant is confident that the financing of the RBC can be achieved through the budget.

The structure, facilities, role and financing are depicted in Fig 7.13 below.

Fig. 7.13 - The River Basin Council



Appendix A

Article 40[14]. Problems and functions basin a water economic board

1. Basin water economic managements (further - basin managements) - territorial bodies of the authorised body in area use and protection of the water fund, having territorial divisions in the areas which primary goal is realisation of the government in the field of use and protection of water fund in territory of corresponding pool.
2. Basin managements carry out following functions:
   1) complex water resources management of hydrographic pool on a basis basin a principle;
   2) coordination of activity of subjects of water relations on use of water resources for the purpose of achievement of positive economic benefit, reasonable, fair and ecologically
   3) Sustainable water use;
   4) preparation and realisation basin agreements on restoration and the protection of water objects on the basis of long-term plans and programs of development within corresponding pool;
   5) realisation of the state control over use and protection of water fund, observance physical and legal bodies the water legislation of Republic Kazakhstan;
   6) conducting the state account, the state water cadastre and the state monitoring of water objects on pools together with the central executive office of Republic Kazakhstan in the field of the preservation of the environment, the authorised body on use and protection of bowels;
   7) delivery, stay of action of the licence or the permission to activity kinds on special water use in an order established by the legislation of Republic Kazakhstan;
   8) the coordination of the conclusions of interested state bodies:
   9) Plans of local executive powers on rational use of water objects of corresponding pool;
   10) Offers by definition of sites of the enterprises and other constructions influencing a condition of waters;
   11) Civil-engineering designs and reconstruction of the enterprises and other constructions influencing a condition of waters;
   12) Documents on carrying out building, дноуглубительных, explosive works on mining operations, water plants, a lining of cables, pipelines and other communications, wood cabin, and also chisel, agricultural and other works on water objects, water security strips and zones;
   13) Plans of measures of water users on preservation, improvement of a condition of water objects;
   14) participation in work of the state commissions on acceptance in operation of objects industrial, agricultural and the construction engineering appointment, waters influencing a condition, and also in works on liquidation of the consequences which have resulted approach of extreme situations of natural and technogenic character;
   15) definition of limits of water use in a cut of water users and on corresponding pool;
   16) participation in the statement of stocks of underground waters;
   17) control of an operating mode of water basins of joint using, large water basins of interbranch, interregional and interstate value;
   18) working out of plans of a fence of water and water division on interregional, inter-regional, interstate water objects and the control over their observance;
   19) the coordination of the scheme of complex use and protection of waters of corresponding pool, service regulations of water objects and water economic constructions;

[14] Informal translation from the Russian

20) participation in working out of water economic balances on corresponding pool;
21) the coordination of offers on granting of water objects in the isolated and joint using and water use conditions in them;
22) a presentation in an order established by the legislation of Republic Kazakhstan, requirements about the termination of financing, designing and building of the water economic and other objects influencing a condition of waters, the established norms carried out with infringement and rules in the field of use and protection of water fund;
23) transfer of materials about infringement of the water legislation of Republic Kazakhstan in law enforcement bodies and court for attraction guilty to responsibility according to Republic Kazakhstan laws;
24) in case of infringement of the water legislation of Republic Kazakhstan a presentation in court of claims about compensation of the damage put to the state;
25) Informing of the population on spent work on rational use and protection of water fund, about accepted measures on improvement of a condition and quality of waters;
26) interaction with local executive and others interested state bodies concerning use and protection of water fund;
27) work on education and population education in business of rational use and protection of water fund;
28) realisation of other functions according to the Republic Kazakhstan legislation.

Article 43. Basin council

1. Basin council is an advisory body, created in frameworks basin agreements.
2. Basin the council headed by the head corresponding basin of management, consists of heads local representative and executive powers, heads of territorial bodies of the state bodies and representatives of water users. The structure basin council can include also representatives of public associations. The work organisation basin council is assigned on basin management.
3. Basin council considers pressing questions in area use and protection of water fund, makes offers and recommendations for participants basin agreements.

8.0 Theme 2: Water Quality Management System

8.1 Proposed Water Quality Standards System (WQSS)

The overall approach to the WQSS was explained at the first Steering Committee meeting 12-13 February, and a presentation provided at the Training Workshop on 14 May. During development, discussions were held with water quality chemists in both Kyrgyzstan and Kazakhstan on the system report. The full water quality standards report is presented in annex 2 and includes the following summary proposals, with the objective of establishing a cost effective regulatory and planning basis for water quality improvement:

- A simplification of the existing PDK system, by keeping only those PDKs for the parameters which are monitored.
- The adoption of former EU standards which would require countries to adopt different levels of drinking water treatment, depending on the quality of raw water abstracted for this purpose.
- The adoption of former EU fisheries standards for designated fisheries. However, this is of lower importance than other aspects of the proposed system, and if a river typology-based system could be developed for fisheries standards, this would make a great deal more sense, particularly for dissolved oxygen.
- That standardised emission standards/permits be adopted for all STWs, assuming the utilisation of biological treatment.
- That BAT-type permitting is rejected for industry. Arguments for its introduction to new industrial plant may offer improved environmental protection at some sites, but its application to existing industrial facilities/enterprises could be an extremely burdensome and costly process, ultimately offering only a low level of additional environmental protection. Alternatively, depending on the methodology used for estimating “excessive” costs, BAT permitting could offer substantially improved environmental protection, but at great socio-economic costs.
- That the legal requirement should be removed for STWs with fully functioning primary sedimentation and biological treatment stages to employ tertiary chlorination.
- A unified and simple water quality classification scheme (5 levels) be used by all CA countries, based on a limited number of parameters:

    - Ammonium (toxicity, particularly to fish)
    - Microbiology (total and/or faecal coliforms, as an indicator of bathing water quality and raw drinking quality)
    - Dissolved oxygen (fundamental requirement for the protection of aquatic life)
    - Salinity/mineralisation (of huge regional importance for agricultural production)
    - Total zinc (both as a proxy for heavy metal contamination generally, and because of its toxicity to both aquatic and human life.

Options for the combination of these individual results into a single “overall water quality” result are discussed, and the median of each of the individual class results is recommended for the classification of overall quality[15].

[15] Water quality classification schemes are usually designed with a wish for the number of sites/waterbodies to fall into each category, e.g. 30% High; 30% Good, 20% Moderate, 15% Poor and 5% Bad. Subsequent changes (improvement/worsening) are reported on the basis of this. Thus, the original class boundaries are set at levels which show that there are still improvements to be achieved, and how progress is made over the coming years/decades. The original setting of class boundaries is, therefore, as much a political decision as it is technical/scientific

- Finally, because of the limited number of water quality parameters which are monitored in CA, and the even smaller number of parameters considered in the chemical/microbiological classification scheme, it is proposed that in the early years of use of the chemical/microbiological scheme a biological monitoring/classification scheme is developed, based on macro invertebrate community composition. Biological status reflects both physical and chemical damage to ecosystems, and as such should indicate where there may be impacts from unmonitored chemicals (e.g. POPs) when there is no evidence of physical manipulation/damage to a sampling site.

The proposed scheme should be used (by all CA countries) to prioritise waterbodies for the development and implementation of action plans (including capital investments) to improve water quality. However, the same class boundaries may also be used as water quality objectives (WQOs), with different boundaries/objectives adopted by individual countries for the same water use. The aim with this approach is to set interim water quality targets, with the intention of achieving these as a route to improving overall water quality.

Thus, for example, Uzbekistan (a downstream country) could choose to adopt a WQO for salinity of 2 mg/l ('moderate') for irrigation supply, while Kyrgyzstan, an upstream country, could choose to adopt a salinity WQO of 0.2 mg/l ('high') or 0.5 mg/l ('good'), for the same water use. Likewise, different microbiological WQOs could be set by individual countries depending on livestock density/municipal wastewater treatment. As water quality gradually improves, in perhaps 10 years time, WQOs should be reviewed, and more stringent objectives set, while keeping the same overall quality classification scheme.

8.2 Capacity Building

The success of any WQSS will be dependent on training and capacity building of the regulatory authorities and the re-equipping of the main laboratories in the Central Asian states. Under this project two key training courses have been designed and delivered at the regional level; one on monitoring and one on IWRM and the EU Water Framework Directive, which underpins the above proposals. This is just the beginning, these courses would need to be supplemented with training in Water Quality Planning, public participation, licensing and permitting and data storage and analysis, and be delivered to wider technical audiences. A training of trainers programme should also be initiated.

A week-long training course on chemical and biological monitoring of water quality was organised and in Bishkek on 11-15 May for participants from the four beneficiary countries. The course was held by Jaroslav Slobodnik, Emília Mišíková Elexov and Bill Parr. The course consisted of 3 days of interactive seminars, focussing on European Experience in implementing the monitoring requirements of the WFD, including intercalibration and quality assurance. The course covered surveillance, operational and investigative monitoring The 3-days of presentation-based training were separated by 1-day biological (macro invertebrate) sampling exercises and a further day analysing the samples collected.

The biological monitoring and river typology training was well received. Kazakhstan already has a small group doing a limited amount of biological monitoring, who have produced a draft national methodology, based on the Woodiwiss index. At the end of the course, participants from Tajikistan and Kyrgyzstan expressed interest in employing biologists for monitoring purposes, but how genuine these statements were, we do not know. While the Turkmens were not dismissive of the approach, they were not prepared to commit at this stage.

All trainees recognised that this was only a preliminary introduction to the subject, and that they needed to seek advice/assistance from biologists within national academies of

science/universities, as well as from external experts/practitioners. The trainees all recognised that there is no 'off-the-shelf' method that can be employed; but that a Regional method needs to be developed internally. Nevertheless, there is a great deal to learn from EU experience in this matter.

A 3-day training course on IWRM and the WFD was held in Dushanbe on 3-5 June 2009, presented by Martin Bloxham and Bill Parr, attended by personnel from Kazakhstan, Kyrgyzstan and Tajikistan. The course focused on the IWRM process cycle, and particularly on the development of a management team, showing how the various aspects of the cycle fed into others. Break-out groups were arranged, initially on a national basis, and then involving teams f mixed nationality were organised to discuss/develop water management issues during the first two-days of the course, with rapporteurs from each team reporting decisions and conclusions reached to the assembled participants for further inter-team discussions.

The origins (existing legislation) and requirements of the WFD were presented, showing inter-linkages with IWRM In essence there are four basic steps involved in IWRM (see section 7.0 above):

- Linking water quality and water quantity management
- Linking surface and groundwater management – treating all waters as a single integrated resource
- River basin management
- Fully-fledged IWRM in which multi-river (sea) basin management is adopted and all anthropogenic activity (including tourism, land use, etc

However, the WFD encompasses only the first three of these 4 major steps.

The different approaches of IWRM/WFD versus existing CA water management practices in which sustainable resource protection rather than continuing resource allocation were emphasised. Similarly, the timescales and expense of good water management, and the requirement of collecting robust monitoring data as the basis of policy setting and operational management were also emphasised. The WFD and other EU water Directives lay down minimum and expensive requirements for the collection of monitoring data, the results of which are analysed and fed back into policy development. It was also shown how the WFD is only part of EU environmental management policy; how other water- and non-water related Directives and policies (e.g. REACH – the EU chemicals policy and the EU Common Agricultural Policy) fit together within an overall vision of improving environmental quality.

Although water quantity is not directly expressed in the WFD (except in terms of groundwater level monitoring), it is nevertheless included through its linkages with water quality (e.g. discharge permits being issued on the basis of the dilution capacity of receiving waterbodies) and through biological monitoring – if flows in rivers are not high enough, good ecological quality will not be achieved).

In discussions at the end of the course participants considered that in terms of IWRM, a dual approach to water management, both at the river basin and the Aral Sea basin levels was required. When pressed as to whether river basin planning should be at a national or international level for transboundary rivers, there was no clear answer, but a general acceptance that if such planning was initially undertaken at a national level, there would need to be strong international cooperation with a view towards international planning. On the development of an IWRM management team, there was acceptance that this was a full-time management job in its own right and not one which could be undertaken by politicians with other responsibilities. The sectoral nature of Government meant that the management team would need to consist of personnel representing the various sectoral (ministerial) interests.

8.3 Water quality pilot projects

The project conducted pilot projects to trial the establishment and feasibility of the WQSS on the River Chu, in a transboundary context, between Kazakhstan and Kyrgyzstan and in the River Vakhsh in Tajikistan. A full description of the two pilot projects and the results are contained in separate reports in Annex 3. The following is brief summary of those documents.

8.3.1 River Chu pilot project

Much time has been spent since the beginning of 2009 on the development of a pilot project on a transboundary section of the River Chu, which forms the border between Kazakhstan and Kyrgyzstan for some 200 of the river's 1300 km length. The river rises in Kyrgyzstan and eventually disappears in the Kazakh steppes. This study:

- Provided data to test the proposed WQS classification scheme from joint sampling/analysis exercises undertaken by monitoring organisations from both sides of the border, enabling results to be compared and staff from each country to observe the analytical techniques used in each other's laboratories
- Provided an insight into analytical abilities on the monitoring of pesticides
- Provided further training on biological monitoring
- Included an assessment of agricultural practices
- Included an overview of available water quality/resource data – both surface and groundwaters
- Identified principal issues concerned with water management in the river basin to be identified
- Included an analysis of current stakeholder opinions, issues and priorities related to water management

The river stretch and catchment drained extend between the Kyrgyz town of Tokmok (population ~60,000) to just downstream of the discharge from Bishkek (population ~750,000) sewage treatment plant. Between these two population centres lies the un-sewered Kyrgyz town of Kant[16], with a population of some 40,000 people. On the Kyrgyz side of the catchment lies the rayon (population >100,000) and town of Kordai (population ~20,000). Drinking and irrigation water for this town and surrounding villages is abstracted from the Chu, but none is returned. Flow in the Chu is noticeably reduced by the Kordai abstraction.

Much of the land within the catchment is agricultural, with a complex system of primary, secondary and tertiary irrigation canals, particularly on the Kyrgyz side of the border. Water is abstracted from the Chu and its tributaries to fill the irrigation canals. The Chu is dammed to form a reservoir to East (upstream) of the pilot area, and this is used to regulate flow in the Chu downstream. This prevents spring droughts from occurring in terms of irrigation supply. However, the majority of field drainage channels are blocked, greatly reducing return flows to the Chu and raising groundwater levels. Agricultural water supply is based on Soviet norms, offering no incentive (or mechanism) for farmers to invest in pressurised irrigation systems which require much less water and would help alleviate salinisation problems downstream.

Tokmok STW and sewerage system was originally designed and built in the 1960s to serve the large industrial/manufacturing plants on the outskirts of the town, and less than one-

[16] Kant contains a large cement factory. On trips past the factory it is not unusual to see lines of up to 40 road tankers queuing to be loaded. The factory was originally built during the Soviet era, with raw materials transported in by rail from large distances in Kazakhstan

quarter of the town's population are connected to it. The majority use soakaways to dispose of wastewater, so surface groundwaters are almost certainly polluted by this. The sewage treatment works employs primary sedimentation, activated sludge and terminal chlorination. The biological process is said by the operators to work effectively and to be in constant use, but on one visit to the works in summer 2008 the aerators were not operational so the activated sludge tanks effectively functioned as secondary sedimentation units only. The sewerage system serving the works is in a very poor state of repair, with some 20 km requiring lining or replacing, so leakage of groundwater into the network is a major problem. Statistics provided by the sewage treatment work operators are inconsistent, but it appears that because of the net ingress of groundwater (approximately 8 times the volume of raw sewage), the wastewater entering the works is actually of higher quality than the treated effluent leaving most EU biological treatment plants. Effluent from the plant is discharged to the Chu throughout the year.

Major industries in Tokmok include a dairy processing plant[17] (Elimay Ltd), a wool spinning/processing plant[18] (Kassiet wool factory**)** and a plate glass factory, all of which have failed to meet their permitted discharge standards in recent years.

Bishkek's population is served by a single sewage treatment works, the effluent from which is discharged to the Chu during winter, but in summer it is diverted for irrigation purposes. Like Tokmok, groundwater provides Bishkek's drinking water supply from deep (>100 m) boreholes.

Groundwater in the catchment is derived principally from snow/glacier melt from the mountain range to the south, with the pattern of groundwater flow in a northerly direction, into and under the Chu (which flows in westerly direction). The quality of water in the Chu is therefore directly influenced by the quality of groundwater, and *vice versa*. Groundwater suffers from a number of localised pollution problems, derived principally from historical agricultural and industrial management practices. Groundwater levels are very high in the Chu floodplain, with noticeable groundwater flooding in riparian fields during summer months.

Negotiations were undertaken to involve as many water-related government departments from both sides of the border as possible, albeit with input limited by finances.

The pilot involved monitoring of surface waters (12 sites – chemistry, biology and microbiology), groundwaters (6 sites [4 shallow and 2 deep] – chemistry) and sediment (12 sites – chemistry), paying particular attention to organic contaminants (pesticides). Two monitoring trips were undertaken for surface and groundwater quality, and one for biology (macroinvertebrate community) and sediment quality. Monitoring sites were selected at a meeting (June 2009) of those organisations involved in the pilot.

Understanding the water economy in transition countries is therefore crucial to domestic national security, as is gauging stakeholder opinion in terms of how water should be

[17] The plant has its own groundwater supply system and produces 1,000 tonnes of butter per month, 70 tonnes of cheese, dry milk and other milk products. Construction of a new pre-treatment facility for discharge of wastewater to sewer should now be operational, replacing the rudimentary pre-treatment facility, which resulted in the clogging of sewerage pipes with fats and suspended solids..However, no biological treatment is provided, so BOD discharges are unlikely to be reduced by much. .Over the last few years, production has doubled each year, representing a real Kyrgyz economic success story. The factory currently employs 650 people.

[18] Built in 1977, the factory produces 70-80 tonnes of yarn per month, but the owners plan to increase production to 130 tonnes per month. The factory buys-in processed wool, cleans and dyes it. About 1000 people currently work at the factory, about half the number employed during Soviet times.

managed and the prices to be paid for the services provided by government (national and local).

8.3.2. River Vakhsh pilot project

The uppermost tributary of the River Vakhsh, rises in southern Kyrgyzstan (where it is known as the Kyzylsu) and flows for 262 km before crossing the border into Tajikstan. There it flows in a north easterly to south-westerly direction for a further 524 km before joining with the River Panj to form the Amu Darya on the Tajik/Afghan border.

The Vakhsh is formed by the confluence of the rivers Kyzylsu and Muksu, the catchment areas of which together cover an area of 15,390 km^2 or 39.4% of the Vakhsh catchment. Downstream of the confluence the river is called the Surhob, changing its name to Vakhsh downstream of its union with the river Obikhingou, 372 km upstream of the Panj confluence.

The Vakhsh catchment is characterised by high precipitation, providing the river with a high yield in the southerly reaches. The territory frequently restricts the river's flow to narrow channels within deep gorges, making it suitable for damming and hydropower. Some 30% of the Vakhsh catchment is at an altitude of >4,000m, and 15% above the average position of the snow line (4,500m). As with the Chu, the Vakhsh is predominantly fed by melting glacier/snowmelt.

The southerly Vakhsh follows a semi-circular route around the town of Kurgantubbe, with flow in a north-south direction. The pilot reach extends from Golovnaya Dam/Reservoir to downstream of Kurgantubbe wastewater effluent discharge. A single large tributary enters the Vakhsh in the pilot area.

During the Tajik Civil War (1992-1997), with estimates of 50-150,000 deaths, heavy fighting took place in and around Kurgantubbe. The town still bears the scars, with an estimated 85% of ethnic Russians leaving the town and returning to Russia as a result of the fighting. Large numbers of the town's population work abroad, notably in Kazakhstan and Kyrgyzstan. While the national economy has recovered to some extent since the end of the war, Tajikistan remains the poorest of the CIS countries, with about half of the population classified as being in poverty and some two-thirds as being involved in agriculture.

As with the Chu, the Vakhsh pilot area is largely agricultural in nature, but with a major town, Kurgantubbe (population 70-85,000), at its centre. The area encompasses land drained between Golovnaya Dam, upstream of Kurgantubbe to just below the return discharge from Bishkek STW. Kurgantubbe forms the axis of a large semi-circular deflection in the river's path from its north-south route, with only a single tributary flowing into the main river within the pilot area. In the pilot area, the Vakhsh is a low turbidity, highly braided river, but the inflowing tributary is very different in nature, containing high levels of suspended solids. Thus, a very noticeable turbidity plume occurs in the Chu downstream of the confluence.

Some 250 m^3/s of water is abstracted from Golovnaya Reservoir, to feed three hydropower stations and a complex network of irrigation canals which supply water to agricultural land surrounding Kurgantubbe. Kurgantubbe's drinking water supply used to be wholly groundwater-derived but the deep boreholes that served the city are no longer operational. Instead, the majority of drinking water is abstracted from the irrigation canal network and chlorinated prior to distribution. Nevertheless, a relatively large proportion of the town's population obtain their drinking water either directly from the Chu itself or from the canal network. In areas outside the town, drinking water is either obtained directly from the Chu or from shallow/mid-depth boreholes.

The town contains some industry, including a large chemical plant which manufactures inorganic fertiliser, an electrical transformer manufacturing plant and a cotton-processing factory. Cotton is by far the most important crop in the area, but subsistence farming for domestic consumption occupies smaller fields.

A single sewage treatment works serves Kurgantubbe – the only sewage treatment in the pilot area. This consists of 6 large sedimentation pools, connected in series, and a terminal chlorination plant.

The same parameters (chemical, microbiological and biological) were measured as for the Chu pilot, and the two pilots tackle the same issues), albeit with a slightly reduced number of sampling sites.

8.4 Findings

8.4.1 Monitoring – Chu pilot

From a chemical perspective, the Chu and its tributaries appear to be in a relatively good condition – Russian PDKs for some parameters, such as copper, were exceeded at some sites, but because the PDK for copper is over 40 times more stringent than EU ambient standards, this is to be expected. Ammonia and nitrite concentrations also presented issues at some sites. As would be expected, water quality (in terms of routinely monitored parameters) is very good at upstream sites in the tributaries, and becomes gradually worse at downstream sites.

Results suggest high levels and widespread of contamination by organochlorine pesticides in both surface and groundwaters, particularly the DDT and BHC groups of pesticides. Although the reported levels are very high, they are not unexpected, despite a reported decrease in recent pesticide usage.

Microbiological quality appeared to be very good at most sites, with the exception of one site downstream of Tokmak (population ~60,000), the reason for which remain unknown.

However, biological monitoring results proved to be much more discriminatory than the chemical results (with results varying from very good to very poor at individual sites). Ecological status generally followed the same pattern as the routine chemical monitoring results, with some exceptions, notably:

(i) On the Al Archa (a Kyrgyz tributary of the Chu), where upstream of Bishkek results were very good, but on passage through the city no invertebrate life at all could be found in the river; and

(ii) The large Kordai abstraction from the River Chu appeared to have a large impact on ecological status – this was much reduced downstream of the abstraction compared to the upstream site.

The proposed water quality classification scheme offered several options for combining the results of individual parameter classifications. Compared with the existing Soviet system either the mean or lowest class options appear to offer a more (politically) acceptable status assessment methodology than the median approach. However, when the biological monitoring data are included as another ‘individual’ parameter classification result, the mean classification approach appears best from a pragmatic perspective, particularly if environmental objectives are to be based on the classification system, and the ‘overall’ status results used as a driver for capital investment.

8.4.2 Monitoring – Vakhsh pilot

Considerable doubts were noted over the quality of the routine chemical parameter results. Because of this, compliance with existing PDKs was ignored, but since these were the only water quality data available, they were used for classification purposes (see below). In general terms, water quality in the lower Vakhsh is of a lower standard than in the Upper Chu, particularly in terms of conductivity/mineralisation. As expected, dissolved oxygen levels were higher in the main river channel than in canals and, as with the Chu, when compared to Western European Rivers, nutrient levels (phosphate and nitrate, at least) gave little cause for concern. Levels of those metals measured tended to be low. Again, as with the Chu, sediments appeared to be contaminated with high levels of organochlorine pesticides, notably belonging to the DDT and BHC groups.

However, the biological monitoring results showed the river to be of substantially lower ecological status than much of the upper Chu.

In terms of the proposed WQS system, combining the results of individual parameter classifications, the mean or lowest quality classification options, which would place most sites in Class 2 (good), or Class 3 (moderate), respectively appear to be the best options, with former being more politically acceptable. However, because the biological monitoring (ecological status) results are so much worse than the chemical/microbiological quality results, if these are introduced into the assessment of overall quality, the mean classification option appears to be the only one which would be acceptable from a political perspective.

8.4.3 Stakeholders analysis

A questionnaire was distributed to representatives of governmental (national and local) and non-governmental stakeholder groups in each of the three 'pilot' countries. The same questions were asked in all countries, based around five main themes:

(i) Public participation in water management decision-making processes
(ii) Natural resources management
(iii) Water economy
(iv) Water status management
(v) Water management infrastructure

In total, 60 completed questionnaire returns were received for the Vakhsh pilot and over 100 for the Chu. This is too low a number of responses on which to determine the direction of future policy, since a single atypical answer to any question could potentially bias the overall result substantially, but some general patterns did appear to emerge.

- Public participation is a two-way process – the governments need to provide more and better information on water management for the public to be involved in consultation exercises
- Water resources management should be directed from the national level, but decisions should be at a more local level. International management (either of transboundary rivers or the Aral sea catchment as a whole) was more strongly favoured in Kazakhstan than Kyrgyzstan or Tajikistan
- Most respondents felt that water bills should remain at the current level – many are currently unpaid, but the proportion remains unknown. Many stakeholders felt that there were inefficiencies in water management which needed to be addressed, before any attempt should be made to increase bills
- There was considerable mistrust with the existing abstraction and discharge licensing processes

- There was a lack of understanding of the environmental status of the rivers and clear difference of opinions over the likely contributions from different pollution sources
- Stakeholders from the countries prioritised investment in water infrastructure for a variety of purposes in the following order.

1. Environmental protection and drinking water supply
3. Municipal wastewater services
5. Irrigation and industrial supply

For irrigation to be ranked so far below environmental management was completely unexpected, and probably reflects a low number of inputs from farmers/the general public in rural areas.

8.4.4 General findings

There is a paucity of data required for robust environmental management of the pilot areas, with the situation being considerably worse for the Vakhsh than the Chu. The scale to which agricultural data are collated/reported to provide a suitable level of discrimination for water management purposes should be reviewed and changes made to allow this to happen. Neither national nor oblast-level collation provides a sufficiently detailed overview of agricultural status/management to feed into river basin management planning.

Water continues to be managed overwhelmingly in terms of quantity, rather than quality, with only scant attention paid to environmental management – albeit more so in Kazakhstan than the other 'pilot countries.' However, the river flow gauging networks are not suitable to fully understand the flow of water through the catchments, and less information is known about groundwater resources than surface flows. Almost no attention has been paid to the estimation of return water flows and ecological flows (one of the tenets of IWRM) have not been established. Agriculture (irrigation) is overwhelmingly the main use in both pilot areas.

There is a deep level of suspicion over whether procedures for abstraction and discharge licensing are followed by the majority of individuals/organisations. Many people believe that they are not, or that permit conditions are not complied with, and there is a strong belief that the current systems of fines and penalties for non-compliance are ineffective.

Of the two macroinvertebrate-based biological monitoring methodologies used, the BMWP-based approach appears to provide similar results to the Woodiwiss index-based approach (as used by authorities for monitoring rivers in western Kazakhstan) in the upland rivers of the Chu pilot area, while offering greater discrimination between individual sites. However, in the mid-lowland and larger rivers of the Vakhsh pilot area, the results of the BMWP-based classification scheme suggested that the rivers were of much lower quality than the Woodiwiss-based scheme. It is clear, however, that neither methodology would be suitable for use as a wider Central Asian methodology, since the establishment of reference conditions (preferably sites) is required for results to be presented as environmental quality indices (EQIs). Any scheme developed should be based on this premise. Nevertheless, the use and development of a standardised Central Asian biological monitoring methodology/scheme is strongly recommended as an adjunct to chemical/microbiological monitoring.

Serious concerns exist over the quality of water/sediment data collected. The improvement of existing analytical quality control/quality assurance programmes should be pursued. Likewise, there are concerns over continued national funding of existing monitoring programmes for which further equipment/training is required. There are too many government organisations involved in monitoring, with a lack of cooperation between them. It

would be better to have a single adequately equipped and funded laboratory with well-trained staff than numerous poorly funded and ill-equipped laboratories.

Water management requires funding to be controlled and managed at a national level, since the funding has to comply with national budgets; however, management decisions should be based at basin level. Stakeholder opinions are divided over whether the river basin should be considered at the national or international (for transboundary waterbodies) level. At present, however, there are no environmental objectives set for waterbodies, to drive environmental management investment for them, either at national or international level. Classification schemes provide the basis of such objectives, so even if management is undertaken initially at the national level of river basins, a subsequent transition to international river basin management (in line with IWRM and WFD principles) would be much easier to achieve.

A particular difficulty in the transition of water management from the Soviet centrally-funded water management system to the current lower-level managed system, relying on cost recovery from individual consumers, is the greater complexity (bills issued by different authorities for different services[19]). This has resulted in substantially reduced cost recovery, with a failure to meet even operational and maintenance costs, and thus a complete stop to investment spending for the future. The lack of a hard-line approach to the non-payment of water service bills (i.e. no payment, no service) means that the standard of service falls dramatically However, the poorest citizens, who would otherwise have no access to drinking/irrigation water, continue to be provided with it, so civil unrest is maintained at a 'manageable' level. International donors provide short-medium term assistance in terms of both finance and expertise. Opinions vary substantially between stakeholders in the two studies on whether non-payers should continue to be provided with water – there is a strong wish for 'ability to pay' to be considered, but means testing in countries with such large 'grey' economies is not a pragmatic option.

8.5 Recommendations

A series of recommendations in the pilot project reports were made for improved water management in both areas. These recommendations are in line with both IWRM and WFD principles, but refer to basin-based management and planning; not just management of the pilot areas. The recommendations cover the following issues:

- Mapping and data collection
- Waterbody identification and characterisation
- Water resource assessment
- Monitoring
- Setting environmental objectives
- Pressure-impact analysis
- Economic analysis
- Agricultural management
- Conjunctive use of surface and groundwaters
- Development of a programme of measures to improve water status

In terms of a follow-on project on river basin management planning, the Chu provides a much better option than that of the Vakhsh because of the greater data availability. Such a project should involve the entire Chu, or possibly the whole Chu-Talas basin, and be used to support the Chu-Talas Commission.

[19] In January 2009, Tokmok Municipality merged its drinking water supply and wastewater treatment functions within a single vodokanal.

9.0 Theme3: Economic instruments

9.1 Introduction

Central Asian countries intensively apply economic instruments for water resources protection and sustainable use. These instruments are briefly overviewed in table 9.1. More detailed overview of the main features and deficiencies of these instruments as well as recommendations for their improvements are provided in the following sections of this document.[20] It should be noted that this study does not include a review of economic instruments in Turkmenistan as this was not requested by the national beneficiary.

Table 9.1. Overview of economic instruments applied for water resources protection and sustainable use in CA countries.

	Kazakhstan	Kyrgyzstan	Tajikistan
Water pollution taxes/charges	X	X	X
Taxes/charges for the use of water resources			
Surface water abstraction fees	X	- [21]	-
Fees for non-consumptive use of surface water	X	- [9]	X
Taxes/charges for abstraction of groundwater	X	X	X
User charges for water supply and sanitation	X	X	X
Charges for irrigation water supply			
Other types of economic instruments	X	X	X
Environmental liability payments	X	X	X
Tax allowances and soft governmental loans			
Product charges/taxes on pesticides/fertilizers			

[20] Detailed review of economic instruments applied for water resources management was undertaken in Kazakhstan, Kyrgyzstan and Tajikistan. It was not done for Turkmenistan as there was no request by the project beneficiaries in this country to undertake . Findings and recommendations reflected in this document concerning economic instruments relate to those CA countries only where the review was conducted.

[21] According to the Water Code of Kyrgyzstan charges for the use of water resources must be applied in the country. This legal requirement, however, has not been implemented yet as charge rates have not been established for surface water abstraction or non-abstractive use.

9.2 Water pollution taxes/charges

Payments for water pollution in the forms of taxes or charges are applied in all CA countries.[22] Legal ground for these payments can be found in national environmental, water related and tax legislation. These instruments were introduced in the region in the beginning of 1990-ies after the break-up of the Soviet Union. Apparently, the system of environmental pollution fees developed in Soviet Union in the end of 80-ies served as a model for their design - environmental authorities in CA countries used Soviet structure of pollution fees as a basis and attempted to gradually adjust it to the changing conditions.

The main feature of the system of water pollution taxes/charges applied in CA countries is that it targets an excessively large number of substances: in Tajikistan, the charges are levied for 197 polluting substances of which 100 are pesticides used in agriculture; In Kyrgyzstan, charges apply to all types of pollutants which could be discharged with wastewaters and for which the so called maximum allowed concentrations (PDK – Soviet time water quality standards) have been established. In Kazakhstan, a few years ago, the government drastically reduced the number of water polluting substances discharges of which are subject to environmental tax payment - at present 13 parameters are levied. Nevertheless the number is still high. For comparison, in OECD countries pollution/emission charges are used only for a limited number of pollutants, mostly air pollutants such as SO_2, NOx and CO_2 and water pollutants such as organic matter (measured in BOD or COD) and nutrients - nitrogen and phosphorus.

Seemingly, covering a large number of polluting substances, the water pollution taxes/charges applied in CA countries are designed to address a broad spectrum of water pollution issues. However, this is not an effective approach. It is impossible to design an environmental policy instrument, including economic instruments, which would be equally effective in addressing all different types of pollution problems. Environmental policy instruments should be selected and tailored to each specific environmental problem.

Beyond the above mentioned fundamental problem related to the design of water pollution taxes/charges used in CA countries there are also the following specific problems:

- charges are fixed at too low rates and they fail to provide a sufficient incentive effect to polluters to change environmental behaviour.
- due to the large number of pollutants which are levied, administration of the taxes/charges, including appropriate monitoring of discharges, charge collection, accounting of revenues from different polluting sources has been problematic.

As a result, effectiveness of these instruments in terms of providing incentive to economic agents for preventing or reducing water pollution is very low.

Water pollution taxes and charges applied in CA countries have more revenue raising function rather than an incentive function for changing polluters' behaviour. However, due to the low charge rates and the weak enforcement of the instrument the revenue raising function has also been eroded - available information suggest that no revenues from water pollution charges were collected in recent years in Tajikistan. This means that water pollution charges are not enforced in this country. The most likely reason is that because of

[22] A distinction is generally made between the term tax and charge: "taxes are defined as compulsory, unrequited payments to general government. Taxes are unrequited in the sense that benefits provided by government to taxpayers are not normally in proportions to their payments. Charges or fees are defined as requited compulsory payments to general governments or bodies outside general government board" (OECD, 1999). In CA region, in Kazakhstan water pollution levies are taxes as they are collected into local governments' general budgets and are not earmarked, while in Kyrgyzstan and Kazakhstan charges for water pollution are earmarked for environmental expenditures and they are collected into environmental funds.

the very low charge rates, cost of their collection and administration would be higher than possible revenues collected; In Kyrgyzstan, in the period between 2004-2008 total revenues from water pollution charges varied in the range of 25–60 thousand USD only; In Kazakhstan no data is available on collected revenues from taxes on water pollution in recent years as the revenues are collected into local (Oblasts) budgets and there is no respective accounting or reporting system in place at the national level. Second Environmental Performance Review for Kazakhstan (UNECE, 2008) reports that the share of revenues from water pollution taxes in the total revenues from all environmental pollution taxes was 2% in the period 2005–2006.

"Polluter pays principle" (PPP) is referred in environmental legislation of all the CA countries and the application of pollution taxes and charges are considered to be the mechanisms for implementing this fundamental principal of environmental management. It is rarely understood that economic instruments are not the only tools for implementing the PPP, but command and control measures, such as environmental standards set by regulations, can also lead to the implementation of this principle provided that polluter bears the cost of pollution prevention or control without state subsidy. Moreover, it should be noted that the PPP can be observed, and can be violated in case of applying pollution fees. If environmental tax/charge rates are too low or the collected revenue is used for subsidizing polluters the application of economic instruments violate the PPP.

As a summary conclusion, the system of water pollution charges used in CA countries is poorly designed, unfeasible to be properly enforced and they fail to implement the Polluter Pays Principle. It would be difficult, if not impossible, to recommend a set of specific changes/revisions which would correct all deficiencies identified in the system and make it effective tool for addressing water pollution problems in CA region. A comprehensive reform of the system is needed. Moreover, there should be conducive legal, policy, institutional, economic and financial frameworks in place. These reforms and conditions, however, seem less realistic to be implemented and achieved in the region in the short term.

In the light of the above, one option for CA countries could be abandoning the current system of water pollution charges and developing a more focused and targeted system in the long term as part of broader reforms promoting well-functioning of markets and enterprises as well as improvements in environmental management. More emphasis could be placed on regulatory measures until a new system of economic instruments are introduced. However, it should be recognised that this option may not be politically acceptable as many vested interests are involved in the current system, specifically those related to generating revenues for local budgets (Kazakhstan) or environmental funds (in Kyrgyzstan and Tajikistan). Therefore, an alternative option would be to simplify the current system of water pollution charges and attempt to enhance their environmental effectiveness, revenue raising function and administration to the extent possible. This could be achieved by:

- Reducing the number of pollutants charged;
- Increasing the charge rates;
- Improving charge enforcement and monitoring.

More details on how the water pollution charges could be revised are provided in the concept paper *Revising the System of Water Pollution Charges in the Republic of Kyrgyzstan* prepared under the WGCA project as a pilot project exercise (see Annex 5).

9.3 Taxes / charges for the use of water resources

Kazakhstan intensively applies taxes for using water resources. Taxes have been levied for surface and groundwater abstraction, non-abstractive use of water resources for hydropower production, fisheries and transportation. Revenues from these taxes, except for groundwater abstraction, are collected into local budgets. Tax in the form of "royalty" is levied for groundwater abstraction in Kyrgyzstan and Tajikistan. A special tax "water royalty" for water use for hydropower generation was introduced in Tajikistan in 2009. These taxes are regulated by the tax codes of these countries and revenues are collected into national governmental budgets.

Taxes for water abstraction and for its non-abstractive use serve as fiscal instruments and they have primarily a revenue-raising function in CA countries. The influence of these taxes on sustainable resources management is limited: there is no incentive effect of taxes on non-abstractive water use and its effect of taxes on abstractive use of water resources may be minimal. However, there is little interest in the region in gauging the incentive effect of water abstraction fees. Environmental or water management authorities do not systematically collect and analyze the information on charge levels, revenues raised[23] and their linkage with or impact on water uses efficiency improvements.

There has been no payment applied for surface water abstraction, neither in Kyrgyzstan nor in Tajikistan, even though this is required by water legislation of these republics. The Governments of these countries could find some environmental and budgetary benefits in introducing a charge for surface water abstraction for industrial purposes. This charge, if properly designed and implemented, would encourage more efficient water use and generate revenues, which could be used for water management improvements. Exemptions from water abstraction charge will need to be granted to irrigation and municipal water supply sectors in the medium term. Reduced water abstraction charges in these sectors could be applied in the longer term. For agriculture and municipal sectors more important in regard to promotion of efficient water use is to apply real costs of provided services. In other words, the strategy at this stage should be to achieve tariffs levels that would ensure covering the cost of operation, maintenance and upgrade of the water infrastructure which is in a dire situation.

As an essential step, authorities responsible for water resources management in CA countries should build information systems to ensure collection of data on the amounts of water uses in different sectors, charge rates and revenues collected. This would make it possible to gauge to what extent the charges affect water use efficiency or whether it would be appropriate to revise the charge rates for increasing their incentive or revenue raising effect. In the long term, water abstraction charges should achieve levels that encourage water use efficiency improvements and water saving.

9.4 User charges for water supply and sanitation

The key purpose of user charges for drinking water supply and sanitation is to recover the costs of providing the services. Ideally, tariffs should be set so that costs of investments in water infrastructure are recovered in a long term and current costs of operation and maintenance of the system are fully covered. If charges for water supply are based on actual - metered water consumption it can also provide an incentive for water saving as the metering shows to a consumer the real amount of water used and related costs. This can stimulate reduction of water use to lower the water bill.

[23] In Kazakhstan water use charges are set by local governments and revenues are collected into local budgets.

Investment component for the development of water supply and sanitation infrastructure are rarely included in the tariffs' structure in the CA countries. Moreover, even though the tariffs have become more cost-reflective over the last years they still remain too low to ensure sufficient revenues for proper operation and maintenance of the infrastructure. The situation in respect of tariff collection has somewhat improved in recent years. However, full collection of due payments for provided water services has not been achieved in many municipalities.

As a result of significant under-investments and poor maintenance the water supply and sanitation infrastructure has been seriously degraded and quality of water services have been deteriorated. The situation is specifically dire in Tajikistan where potable water cannot be used for drinking in many municipalities and in some settlements central water supply has been limited or is unavailable.

Cross-subsidisation between customer groups is common in the region. The charges levied on households are much lower than charges for commercial users. In Kazakhstan governmental provides substantial subsidies to households. These forms of subsidies are not equitable and they do not promote efficient use of water.

In all CA countries municipal water supply and sanitation charges are paid for norm-based consumption. Actual metering is rarely applied in households in Tajikistan and Kyrgyzstan. In Kazakhstan it has been used in a few places. The low levels of tariffs and the absence of water metering promotes inefficient water use. There is evidence in some municipalities in Kazakhstan that water metering coupled with reasonable tariff rates can encourage water savings.

Critical for reforms in water supply and sanitation sector in CA region would be the abolishment of price distortions in water services and enhancement of payment discipline. Tariffs reform in the sector should be directed towards gradually raising the rates to levels that allow sufficient funding to cover costs of operation, maintenance and upgrade/reconstruction of existing water infrastructure in the medium term, while moving to full cost recovery for utility services in the longer period of time. Installation of water meters should be promoted to encourage efficient water use.

Increasing the water supply and sanitation tariffs is a politically and socially sensitive issue, especially in some CA countries where households' average income is very low and poverty is widespread. Therefore it will be a challenge for the governments to manage the process of tariff reforms. Affordability analysis and developing social security schemes should be central in this process. So far, both low income and relatively wealthier households benefited from (enjoyed) water services at low costs. However, it needs to be recognized that by allowing water supply and sanitation infrastructure to degrade due to the poor financing and maintenance the problem will exacerbate and social and economic losses will be higher in future, and, ultimately, the poor will be forced to pay more for the access to clean water. Therefore, targeted subsidies and social security schemes should be used to address affordability problems of lower-income water users.

One of the main obstacles to the financial and operational sustainability of the sector in CA countries is the absence of proper financial planning by water utilities. The lack of capacity in financial planning and management are important causes for this situation. It is suggested that governments of CA countries cooperate with international donors and financing institutions to help local municipalities and water utilities for building capacities to improve financial planning, undertake tariffs reforms, raise adequate funds on their own books in the long run and efficiently and effectively manage the resources in order to improve water supply and sanitation services for the population.

9.5 Charges for irrigation water supply

Water use for irrigation is crucial for economies and livelihoods of rural population in CA countries. In Soviet time extensive networks of irrigation and drainage canals were developed in the region and the government allocated significant funds for the operation and maintenance of the infrastructure. The situation changed with the break-up of the Soviet Union and the following economic downturn in CA countries Governmental funding for irrigation reduced dramatically. However, this was not followed by undertaking appropriate institutional and tariffs reforms in the sector. Tariffs in 1990-ies and beginning of 2000-ies were set at very low rates. Despite increase in recent years, the tariffs still remain far below the cost recovery levels - they cannot cover the costs of operation and maintenance of the irrigation and drainage networks. Moreover, even the low level tariffs have not been fully collected for years.

As a result of poor financing and inadequate maintenance the irrigation infrastructure has been deteriorated significantly and water losses in the network are substantial. For instance, in Tajikistan water distribution efficiency is around 55% only, i.e. about half the abstracted water is lost in the supply network. There is no reliable information on the current state of the irrigation infrastructure, scales of deterioration, financial needs and available funds for its rehabilitation in this country.

Tariffs below cost recovery levels, poor tariffs collection discipline and the absence of metering encourage wasteful use of water resources in irrigation sector, undermine the maintenance of the infrastructure and hamper the efficiency improvements all across the CA region.[24] The irrigation infrastructure will continue to deteriorate unless urgent institutional and tariffs' reforms are undertaken.

Governments of the CA countries should set a policy objective to increase the tariffs to achieve recovery of costs of operation and maintenance of the irrigation systems. It is recommended that the governments elaborate plans and financing strategies for developing the irrigation sector. These strategies should provide a clear picture of the current state of the irrigation infrastructure and set realistic objectives for improvements and developments. They should also assess the gaps between available and needed resources for achieving the objectives, and identify financial sources for covering the gap in a certain period of time. The sources would include tariffs paid by farmers, governmental subsidies, international concessional loans and commercial funding.

9.6 Other types of economic instruments

9.6.1 Environmental liability payments and insurance schemes

All CA countries have established systems of environmental liability or damage compensation payments which operate complementary and or in parallel to the system of pollution charges and natural resource payments. Polluters and users of water resources can become liable for damages to the environment in case of accidental discharges or if licence and permit requirements are not complied with. There are some elaborate rules for determining the size of the damage compensation payments - e.g. Tajikistan uses a very complex and outdated Soviet time methodologies for assessing environmental damage and levying liability payments for violation of water legislation.

[24] In Kazakhstan, tariffs are subsidised by the central government. Nevertheless the tariffs, as reported, are far below the levels of full cost recovery.

Theoretically, liability for environmental damage or cleanup costs may lead to the creation of a market for environmental insurance. In a well-functioning market, insurance premiums would be expected to reflect the probable damage or cleanup costs and the likelihood that the damage will occur. This would create an incentive for polluters, as they would enjoy lower premiums for industrial processes that have a lower risk of pollution or accidents. However, this seems less realistic to happen in the short or medium term in Tajikistan and Kyrgyzstan as the development of a well functioning market economy and financial markets seems to be a matter of the long term perspective.

In Kazakhstan, a civil liability insurance system for infliction of damage arising from accidental environmental contamination has been established. This is a compulsory environmental insurance scheme in which companies performing “ecologically dangerous” types of economic activities must be involved. The types of environmentally risky activities are determined by the national environmental legislation and the insurance system is regulated by the Law of the Republic of Kazakhstan on “Compulsory Ecology Insurance” adopted in 2005. Insurance payments are provided at liability of a legal or natural person, to reimburse for the damage inflicted to life, health, property of the third parties and/or environment resulted from accidental pollution. As reported, 9 insurance companies were involved in environmental insurance activities by 2009 and the insurance market is developing in Kazakhstan. At this moment, however, no detailed information is available on how the insurance system works and how it affects decisions and environmental behaviour of industries in the country.

9.6.2 Tax allowances and soft governmental loans

Environmental legislation of CA countries envisages application of tax allowances and soft governmental loans for promoting environmentally friendly investments in private sector. Nevertheless, these instruments have not been applied in practice. As reported, national tax or budgetary legislations do not contain provisions allowing application of these schemes. In some national and international reports on the use of economic instruments in the CA countries this is considered to be a missed opportunity for promoting the use of environmentally friendly and resource efficient technologies. However, in our view, it is unlikely that CA countries can effectively apply tax allowances and concessional loan schemes in the short or medium term given the current economic, financial and administrative capacities in the countries. Effective implementation of these instruments would require development of a comprehensive regulatory frameworks, monitoring, reporting and administrative capacities. Otherwise these schemes may induce enterprises to engage in rent-seeking behaviour, such as tax avoidance, and open a window for corruption in tax collection and environmental authorities.

9.6.3 Product charges on pesticides/fertilizers

Water pollution with agrochemicals discharged from farmlands is a problem in CA region. To deal with this problem Tajikistan has legally established payments for discharges of pesticides into water bodies. Charges are levied on a long list of pesticides and the amount of charge to be paid is related to the amount of pesticides discharged in water bodies. Available information suggests that these charges are not enforced in Tajikistan. Indeed, enforcement of this economic instrument is not feasible as it is impractical to trace the amounts of chemicals absorbed, the movement of the surplus and its impact on groundwater, and finally the run-off into surface water bodies. The calculation would involve an impossible amount of data for many polluters.

In some countries with more advanced economies and environmental management systems so called “product charges” are applied to chemical fertilizers and pesticides used in agriculture as a proxy for water pollution charges. Theoretically, product charges could also

be applied in CA countries. The charge could be applied at the stage of their import, production, wholesale or retail sale. However, it should be taken into account that in CA region, where capacities for controlling the import, production and distribution of agrochemicals is relatively weak, introduction of product charges on less hazardous agrochemicals may encourage farmers to use more dangerous chemicals which officially will not be charged. It should be noted that application of highly hazard chemicals, specifically some persistent organic polluters, must be banned in agriculture or phased out gradually. No economic instruments would be appropriate for these chemicals. Therefore, it is not recommended to introduce product charges on chemical fertilisers and pesticides in CA region, unless economic situation of farmers improves and capacity to regulate agrochemicals discharge is in place.

9.7 Environmental funds

Some economic instruments related to water resources management, such as water pollution charges and damage compensation payments, are earmarked in Tajikistan and Kyrgyzstan for financing environmental activities. Revenues from these payments are collected into environmental funds established at local and national levels. These funds are, essentially, extra budgetary accounts of environmental authorities and their local departments. Other sources of revenues for the funds are air pollution charges and charges for the use of natural resources. Efficient and effective use of these financial resources could result in environmental improvements on the ground.

In Tajikistan environmental funds exist at municipal, district and national levels. In Kyrgyzstan the system of environmental funds includes the Republican Fund (central fund) and district ("Oblast") funds. The number of district funds was reduced from nine to seven in 2005, with further consolidation into four funds (Chu-Bishkek-Talas, Issyk-Kul-Naryn, Osh-Batken and Jalal-Abad) in 2008.

Financial resources accumulated into extra-budgetary funds of environmental authorities at national and local levels are very small. Furthermore, environmental authorities spend these limited financial resources very inefficiently. As reported, in Tajikistan the revenues are mostly used for different administrative needs of local environmental committees. Similarly, in Kyrgyzstan a great portion of the funds' budgets are used to finance the management activities of the State Agency of Environment and Forestry Development and its local departments. Available reports suggest that there is little transparency in the way the funds operate, including how decisions on distribution of funds are made, how priorities are set and how projects are selected.

Efficiency of management is a critical problem of the system of environmental funds in these countries. Revenues collected are too small to justify existence of extra-budgetary funds at the level of local environmental authorities. Therefore, from the economic efficiency point of view, consolidation of all revenues into a single national environmental fund should be sought as an option for dealing with this problem. Consolidation of the revenues generated by all types of environmental payments and spending the financial resources for priority environmental projects, based on strategic plans and programs and using vigorous projects selection criteria, would help to increase the efficiency and effectiveness of environmental expenditures. Current practice of using the revenues from environmental payments for covering administrative expenses of the committees should be abandoned. These expenses must be covered by central and local governmental budgets. Some portion of revenues could be used for increasing the capacity of environmental authorities, e.g. enhancing monitoring and inspection capacities.

Unlike Kyrgyzstan and Tajikistan, there is no special environmental fund in Kazakhstan. Environmental funds, which were established in Kazakhstan during the 1990s at the State and local levels, were abolished in 2002. According to a recent Environmental Performance Review conducted by the United Nations: "The main problem with these funds was that they generated little value added for environmental policy-making. A major reason for this, in contrast to international standards, was that they were not engaged in the identification, appraisal and selection of particular environmental projects".[25]
Since the time environmental funds were abolished in Kazakhstan environmental fees and fines form part of revenues of the local budgets and they are used to finance a variety of activities and not solely expenditures on environmental protection. On average, spending on environmental protection in oblasts of Kazakhstan corresponds to 15% of the revenues actually collected from environmental charges.[26]

Currently, the Ministry of Environment of the Republic of Kazakhstan is exploring the ways for re-establishing a national environmental fund which would ensure that revenues raised through environmental fees are used for environmental expenditures. At the request of the Ministry the WGCA project prepared a *Discussion Paper on a Proposal to Re-Establish a National Environmental Fund in the Republic of Kazakhstan* (see annex). This paper concludes that prior to making a final decision to re-establish a Fund the government of Kazakhstan needs to undertake:
a) an assessment of how well, in terms of efficiency and cost-effectiveness, the limited resources currently allocated for financing public environmental expenditures are being managed at the local (*oblast* and city) level.
b) an in-depth analysis of the potential impact and consequences of re-allocating some or all of the revenues currently generated by environmental taxes from local budgets to a budget managed by the Fund.

It has been emphasized that stakeholders in the government of Kazakhstan need to gain consensus on the establishment of the Fund and that the creation of a well-structured and managed environmental fund would help to overcome existing problems and constraints related to public environmental financing. The paper presents an overview of the key principles for establishing and operating a well-managed environmental fund.

9.8 The potential for introducing new economic instruments

Currently, there is no regional economic instrument in place in CA for the management of water resources. As part of the training in Economic Instruments in the Water Sector held in Astana, Kazakhstan, 22-23 October 2009, the *concept of payment for ecological services for Integrated Water Resources Management* was presented to the trainees including representatives of various stakeholder institutions of CA countries. The concept implies, for instance, that downstream users of water resources offer economic incentives to farmers or land-owners upstream in exchange for managing their land to provide some sort of ecological service. The scheme, presumably, could be applied in the region for addressing water scarcity or water quality issues. However, discussions related to the topic of payment for ecological services revealed that this scheme cannot realistically be applied in the context of CA region as the countries are not prepared for it at this stage.

[25] Environmental Performance Review – Kazakhstan – Second Review; United Nations Economic Commission for Europe; 2008; page 100

[26] Revenues from environmental pollution charges and revenues from inspection activities, as well as environmental protection expenditures in the Republic of Kazakhstan from the perspective of *oblasts* as of 1.09.2009 [*Поступление платежей за загрязнение окружающей среды и средств от инспекционной деятельности, а также расходование средств на природоохранные мероприятия в Республике Казахстан в разрезе областей на 1.09.2009 год*]

An overall conclusion and recommendation of the study on economic instruments used for water resources management in CA countries, undertaken under the WGCA project, is that in the context of current level of socio-economic development in the region and institutional capacities for environmental management, governments should not be aiming at introducing types of economic instruments which are targeted at internalising external environmental costs related to the use of water resources. Rather the governments' strategic priority in the short and medium term should be to help municipalities, water utilities, water users associations and water management organisations at local levels in setting and enforcing tariffs for water services (drinking water supply and sanitation, irrigation water supply) which would ensure recovery of costs of the provided services, including costs of operation, maintenance and upgrade of the water infrastructure. This would help to stop further deterioration of the water infrastructure and water services. This would also help to increase water use efficiency and improve water quality in the region.

10.0 Theme 4: IWRM and River Basin Planning

10.1 Introduction

Under theme 4 the project focused on strengthening of cooperation between key Government stakeholders within the context of Integrated Water Resource Management and reviewing of the status of water resource and IWRM planning. Although they are key elements in the improvement of water governance, the project has not been engaged on the establishment and strengthening of Water User Associations, Irrigation Management Transfer (IMT) strategies or River Basin Authorities and Councils These activities were already addressed by numerous donors and IFIs including the Swiss Development Cooperation Agency, USAID, GtZ, WB and ADB and the project didn't want to duplicate these efforts. However, that said, in Tajikistan the project has assisted the FAO with initiation and development of the Government's IMT strategy.

The regions national water resource planning documents come in all shapes and sizes ranging from IWRM and water efficiency plans to water programmes set within national development strategies, but all of them are characterized by similar high-level policy aims and objectives. These documents are fundamentally policy documents tied to investment programme aimed at strengthening and expanding the management framework in line with the concepts of IWRM and River Basin Management. What they lack, with one exception, is any scientific analysis of the baseline and, as a result, meaningful forecasts of future situation. They contain no maps showing reservoir locations and volumes, abstractions points, environmental flows and demand centres or ambient water quality and water use standard designations and discharge points. In general there is minimal data on groundwater resources except perhaps a crude summary of total licensed volumes with no descriptions of the extent of the major aquifers and their structures or details of abstractions and there is little ecological data or detailed commentary on impacts of climate change. All these data would be required for a planner to establish any meaningful water resource strategy or a river basin plan and would be a pre-requisite to a higher policy level IWRM strategy. High level policy strategies available refer to transboundary problems and issues simply in terms of their obligations under the various inter-state and international agreements, with no analysis of those problems and issues, and no reference to an ecological management approach. It is telling that many of these strategies were developed in part or whole with the support of the international donor organizations rather than the Governments themselves and perhaps ironic that in a region where water is such a critical issue and important resource that Government funding cannot found for these basic planning steps. It is perhaps that these data do not exist or are questionable but if this is the case then the countries should be more candid and forthright and about the status of water resource knowledge. It is understood that water resources are a politically sensitive issue, but they cannot be addressed until there is an acknowledgement of the limited understanding of the water resource systems. It should be noted however that there are in existence some detailed studies of water resources such as UNDP Kazakhstan Water Resource review (see below) and the recent JICA study of the Tokogul reservoir its impact on the Fergana valley, but these are rare finds.

With regard to water resource planning there are a number of general points which should be addressed.

The countries need to determine the yield of their systems taking into account drought events, multi-year basin storage (SW and GW), environmental flows, climatic change and, critically reflecting different uses, demand patterns in a consistent manner - the raw data on which the assessments need to be available to all parties and should be subject to close scrutiny. There needs to be an understanding of the difference between water supply and demand. Countries should provide accurate estimates of water demands, not simply based

on exaggerated Soviet norms, and credible component demand forecasts taking into account compound population and economic growth factors, instead of extrapolations of dubious base figures.

In determining their yields and demands the countries must use similar methodologies and establish common environmental protection measures, water efficiency objectives, and climatic change scenarios and impacts. Climatic change will not only impact on the resource yield but also water demand, something which doesn't seem to have been addressed in the plans reviewed. In assessing water resource deficits and surpluses countries should first look at demand management and water efficiency and second at resource developments, including increased storage, conjunctive use and increased utilisation of groundwater, and their transboundary implications. National water resource plans should be presented in a common format with common planning horizons and economic assumptions to ensure that when extrapolated to the regional/basin level we are comparing apples with apples.

As discussed in previous sections of this report, there is a regional tendency for water resource managers and users alike to view water as a 'free' commodity which should be utilised whenever available to increase productivity, even if that increase in productivity is proven or not. Water is removed from the river whenever available to the maximum extent with little thought of downstream users and the environment. This can be seen in the abstraction amounts recorded by SIC-ICWC consistently exceed the agreed abstraction limits year-on-year. Why in a wet year do the countries need to abstract more water, why not the same amount or less? The abstraction limit needs to be implemented through strict policing and the savings made through good house-keeping can then be used either to increase or rehabilitate irrigated lands or increase the environmental protection level. Over watering is a major problem which at its root has cultural as well as technical causes.

As discussed in section 10.3, the possible level of environmental protection needs to be tested and must reflect the values system of the riparian and wider communities. Are the riparian communities, poor as they are, unconcerned about, even unaware of, their environment and, as is often stated, do not place any value on it? Is there any evidence to support this belief? Based on the stakeholder analysis and questionnaires conducted as part pilot projects, the answer much more complex and requires detailed evaluation. It is recommended that the driver for improved water efficiency shouldn't be solely expansion of irrigated lands and increased economic output, but also improved livelihoods and increased environmental protection – a position the countries should embrace with the IWRM concept.

The following sections contain descriptions of the status of water resource and IWRM strategic planning in the four participating countries.

10.2 National Reports

10.2.1 Kazakhstan

In 2004 the UNDP commissioned a review of water resources in Kazakhstan in support of the Millennium Development Goals, in particular to Ensure Environmental Sustainability. The report was produced in close cooperation with the Committee of Water Resources in Kazakhstan and represents the most comprehensive document of its kind produced in the region in recent times. It is a good baseline of water resource knowledge up to 2001, providing surface and groundwater source yields at during average and 1 in 20 year drought years at the basin level. In the eight river basins, the report provides demand figures based on sector and overall water balances up to 2001. In an average year there is a surplus of water but in drought years (1 in 4 and 1 in 20) there is an overall water deficit. There are details of the environmental and sanitary flows (for the Syr Darya it is 3.3km3 out of a total

flow of 14.6 km3) but there are no details of how the figures are calculated. The report contains a significant amount of information on GW resources and use of current economic instruments. It contains good solid analyses of the problems issues in each main water use sector, particularly irrigation and public water supply. The report does not include any demand forecasts and problems of water quality are dealt with superficially, suggesting a lack of data. The data and information presented seems to have been taken at face value and it veracity is not investigated. The report concludes that the water deficits must be addressed by improvement of water efficiency in the first instance. The report comments on the need for increased environmental flows but not on the impact of climate change. It does not make any forecast for future demand and water balances and doesn't look at the problems in detail at the basin level. Although the demand side of the equation is considered at the national level the supply side, water resource development options (GW development, conjunctive use, in basin storage) are not.

The Kazakhstan National Integrated Water Resources Management and Water Efficiency Plan is the most comprehensive plan of its type prepared in the region and, as far as the Consultant can ascertain, was implemented very closely in line with Global Water Partnership guidelines. The plan was supported financially by UNDP and followed directly on from the above Water Resource review, with the first draft plan produced in November 2005. Although the two studies are clearly connected the they do not refer to each other and the Consultant can find no logical reason for this omission.

In its original draft form (there has been numerous subsequent drafts) the plan it sets out clearly the concepts of IWRM and Water Efficiency and how these concepts can be realized in Kazakhstan. It gives details regarding the necessary strengthening of the legal framework and the options for reforming the institutional structure taking into account the IWRM objectives and political and fiscal constraints. It proposes the implementation of the plan under the existing national committee of sustainable development and the establishment of either a State Water Agency or a Water Ministry. It assumes that the strengthening of River Basin Organizations (RBO) as semi-autonomous bodies and creation of decision making River Basin Councils as prerequisites to IWRM; bringing water quantity, water quality, surface and groundwaters and dam safety under a single decision framework – there is no reference to the energy sector, fisheries or directly to nature conservation. Data and information collation and is to be undertaken at the national level whilst analysis and planning at the river basin level. The work needed to strengthening the RBOs is described and costed in detail, down to the number of staff and their disciplines required in each of the eight basins. The strategy also includes various programmes outlined for strengthening of service providers such as the hydro-meteorological service.

Under the Water efficiency Plan the key problems in Kazakhstan are identified, including;

- low efficiency of use, especially in irrigation
- damage to the Syr Darya wetlands due to over abstraction
- reduced yields from irrigated agriculture
- massive costs due to reduced crop yields and unnecessary investments
- significant problems of drainage water disposal
- damage to water quality in the rivers and groundwaters
- increasing losses of cultivable land from salinity
- an important relationship with transboundary issues

It appears strange given the existence of the Water Resource review that a detailed analysis of the above problems is not included in the IWRM and Water Efficiency plan. Only summary national figures for existing and forecast demands are presented, not broken down into river basins and only simple trend rather than component demand forecasts are provided. Also

there is little reference to changes in the institutional framework in the irrigation sector - for example, an Irrigation Management Transfer strategy and splitting of the management and operational functions, and the establishment of Water User Associations as a first means of improving water efficiency.

The implementation programme had a duration of 18 years at an estimated cost in the first four years of $235 million, which includes the strengthening of the RBOs and establishment of River Basin Councils. The cost of the plan over the full 18 years is not estimated.

The plan was comprehensive and well written, but very ambitious. It was developed in a participatory approach and had the support of the main executive ministries; however, to date the plan hasn't been approved by the Government. After the first draft a number of further drafts were prepared and circulated, each draft reducing the plan's scope and ambitions. A final draft was produced by the Committee of Water Resources in December 2009, but it is a much reduced document which contains no reference to costs and financing. The Consultant doubts whether this document is a solid base for IWRM implementation in Kazakhstan and suggests that the Government must decide on the level of investment in the water sector it can or is willing to afford, linked to a thorough analysis of the priority problems indentified. It is noted that the Committee of Water Resources of Kazakhstan has already implemented some of the activities under the original plan including the establishment of the River Basin Councils, but it is unclear whether these actions are sustainable. It is understood that the CoWR has invested $1 million in the plan to date.

10.2.2 Kyrgyzstan

The 2003 draft Water Resource Strategy of Kyrgyzstan was prepared by an expert group drawn from the governmental stakeholders, financially supported by the German Friedrich-Ebert Fund. It is brief document which covers the topics of water resources, water quality and sectoral water demand quite superficially. It only provides a very weak baseline of the status and management of water resources in Kyrgyzstan.

The document contains clear policy directions to be followed in the water sector, including the strengthening of the legal and institutional frameworks, development of WUAs, water pricing, strengthening of scientific and research base, and foreign water policy. The plan contains a series of proposed interventions under the various headings but these are not set-out in an implementable programme and they are not costed.

Revision of the 2003 Water Strategy is long overdue and was to be undertaken as part of the World Bank Water Management Improvement Project; however, this has so far not happened. The WB project has made proposals for institutional change (April 2008) which have recently been acted upon (see section 6.0 and Annex 1) and proposals for implementation of IWRM (December 2008). The proposals for IWRM implementation include the establishment of State Water Administration and a Licensing Working Group and, at the basin level, the strengthening and institutionalization of the Talas River basin Council. However, none of these proposals are costed and the process by which the various management bodies are to be brought together is not well explained. Kyrgyzstan needs a water resource plan as a pre-requisite to an IWRM strategy.

10.2.3 Tajikistan

Tajikistan has an approved Water Sector Development Strategy which produced in 2006 and contains some useful baseline material, particularly on the status water supply and sanitation, irrigation, hydro-power and industrial water supply sectors. There is commentary on the legal and institutional reform necessary for implementation of IWRM, although little data and no analysis of water quality in the document. The document is weak in its analysis

of water resources and existing and forecast demands, which are summary figures and are scattered throughout the document. More critical is that there is no logical thread running through the document and the approaches to strategy development or the strategy itself. Consequently the resulting development programme is overly ambitious and unaffordable within the timescale.

An updated Draft Water Resource Sector Development plan was produced in November 2009 with the support of OSCE and has recently been submitted to the Government for approval. The document is similar in its structure to the early document; however contains more baseline data, particularly in the economic analysis of water use in the various sectors. The coverage of the strategy and programme has been expanded to include:

- Water Tourism
- Water Disaster Management
- Water Quality Management
- Climate Change
- Information Management

Again, however, the Strategy is not clear and the document for all its valuable informational content jumps around from topic to topic. The development programme is based upon the 2006 strategy, but excludes the hydro-power components (except for interventions to improved coordination between water and energy sectors) and includes new components addressing the new sectors and issues. The programme is over 15 years (2010 -2025) time-scale and is prioritized into short, medium and long term interventions and the value of the programme is over 3 billion somi or $900 million. It is unclear to the Consultant how Tajikistan could afford such an ambitious strategy given existing low levels of state funding in the sector. The document is an improvement on the existing strategy in terms on laying down a baseline, but the Consultant does not believe that as a strategy for improved water governance in Tajikistan it is viable. In December 2009 the Tajik Government issued a declaration stating that it will immediately develop an Irrigation Transfer Management strategy based on the river basin principle and, at a later date, develop an IWRM strategy.

10.2.4 Turkmenistan

In Turkmenistan there is no specific water resource strategy, instead there is a water industry and land reclamation component of the 2000-2010 of the Strategy of Social and Economic Reforms. The component document makes no specific reference to improved governance of the water sector. There is no mention of IWRM, River Basin management or the establishment of WUAs or Irrigation Management Transfer as means of improving water use efficiency. It deals solely with the performance of the irrigation and industry sectors as water users – the historical and planned productivity – and purely on the operational side. It includes detailed tables on the irrigation and industrial demands and the water use efficiency. There is no evaluation of the water resources either national or regionally nor is there any assessment of the water quality. Public water supply issues are not discussed in the document, although that is not to say they are not in another component of the overall strategy. There is no mention of the Golden Lake as a recipient of the polluted return flows in order to protect downstream public water abstractions from the Amu Darya as part of larger water efficiency programme. The investment programme in the document is relatively detailed but focuses on the maintenance of the existing systems and investments needed to improve efficiency to meet the predicted demand.

The Ministry of Water Economy is currently preparing the 2010 – 2015 strategy, but the Consultants were unable to see the draft document.

10.3 Environmental Objectives

As mentioned above, the acceptance of and commitment to IWRM has made the CA countries acknowledge the need for a sustainable development and management of water resources and acceptance of the environment as a water user. The IWRM concept is based on the perception of water as an integral part of the ecosystem, a natural resource and a social and economic good, whose quantity and quality determine the nature of its utilization. The IWRM concept, as developed by the GWP, consists of three Es - economic efficiency, social equity and ecosystem sustainability.

- Economic efficiency in water use: Because of the increasing scarcity of water and financial resources, the finite and vulnerable nature of water as a resource, and the increasing demands upon it, water must be used with maximum possible efficiency;

- Equity: The basic right for all people to have access to water of adequate quantity and quality for the sustenance of human well-being must be universally recognized;

- Environmental and ecological sustainability: The present use of the resource should be managed in a way that does not undermine the life-support system thereby compromising use by future generations of the same resource.

The three Es are in competition: a drop of water that is used for economy is not available for the ecosystem and for social needs; a drop of water kept for the benefit of an ecosystem is not available for the social needs and for the economy. The IWRM challenge is to balance and integrate these three objectives, but how can it be achieved? This Simply this could be done by reducing the degrees of freedom, fixing one objective and the balancing of the other two under different scenarios; for instance, fixing environmental objectives and balancing the economic and social objectives – thus protecting the weakest of the objectives, the most likely to be neglected. However, it should be noted, in a transboundary context, that the environmental objectives which dictates the water resource availability, needs to be set regionally, whilst the balance between social and economic developments are set nationally and even sub-regionally.

It is interesting to note that the fate of the Aral Sea and the water resources which fed into it was sealed long before the break-up of the Soviet Union, if fact the decision to utilise the Aral Sea was made at the turn of the 20th century. The following passage is taken from the web site of the ICWC – Scientific Information Centre web-site.

Though the Aral Sea desiccation is attributed to the Soviet State as the main initiator of this natural-anthropogenic disaster, the concept of sacrificing the Aral Sea for the sake of irrigation and agriculture development actually belonged to scientists of the pre-Soviet period. In particular, A.I. Voyejkov (1908) insisted that under effective agricultural practice in the region the Aral Sea existence is absolutely not justified, since economic effect of its existence (fishery and navigation), in his opinion, is much less than the effect of economic development, especially, irrigated agriculture. The same idea emerged in 1913 in the mind of another person, not a scientist, but the head of the water sector in the former tsarist Russia, the Director of the Land Improvement Department, Prince V.I. Masalsky. He considered that a final goal was “use of all water resources of the region and creation of new Turkestan…, developing million hectares of new lands and providing cotton demanded for Russian industry… ”.

It was therefore inevitable that eventually the decrease flows due to irrigation development would make an impact on the Aral Sea and its wider environment and by the 1960s, when problems began to be recognised, the damage had been done and were irrevocable any decision to scale back irrigation could only partly mitigated the process. If the Amur Daraya

and Syr Daraya flowed into the open ocean then the historical development would not present a problem and the simple reduction or improved efficiency of water could rectify environment damage. But the Aral Sea resources have been depleted and continue to be so, scattered throughout the basin in flooded areas and enhanced GW levels; and, critically, with the reduction in receiving waters the Aral Sea has become increasingly saline and more inhospitable environment.

In selecting a set of environmental demands for the CA one has to recognise that water resource availability was not a question until 1950's. Before then the scale irrigation practiced, although jeopardising the environment did not bring about the long-term changes which are now apparent. Large collective farms the introduction of cotton in the 1960s changed all that and economic and social targets became paramount. Proposed Soviet mitigation measures to divert water to the Aral Sea from the Northern flowing rivers were never going to be feasible.

Where does this leave us? If we look at a number of in-flow scenarios for the Aral Sea and their impact on its rehabilitation, we find that here are few options:

- Compliance with 1992 flow agreements but no improvement in water use efficiency – continue reduction in the Aral Sea volume
- Improved water use efficiency increasing flows to balance current evaporation from the current Aral Sea surface area and maintain existing status. It is unclear what level of increased flows would be required, to achieve a current balance, although a simple computer model could be constructed.
- Dramatic reduction in water use including reduction in irrigation use – long-term, gradual recovery of Aral Sea.

We know that the Aral Sea cannot be wholly rehabilitated even if irrigation were to be drastically reduced, simply due because of the deficit built up during the past fifty years and therefore any such environmental objective should be discarded as the basis of any water resource management programme. If it hasn't already, a water balance model for the Aral Sea should be developed to determine the relationship between in-flows and evaporation losses and the maximum potential size of the Aral Sea which could be maintained for any given in-flow. Such a model could also be used establish the salt balance in the Aral Sea. Consideration should be re-focused away from the Aral Sea and on to the two main river basins themselves and how their ecosystems can be protected by placing realistic and enforceable environmental constraints and standards, on both water quantity and quality and setting the bounds for water resources availability. At present there is little information concerning the ecological status of the rivers and wetlands. The key ecosystems along the rivers should be surveyed and minimum flows established based on best international practice at critical points. The environmental flows should take account of a need for a minimal baseflow and seasonal flows required for fisheries and sediment removal. Groundwater management levels need to be determined for the protection of wetlands and water quality needs to be assessed throughout the river basins in particular the lower reaches where salt is a major issue. This is discussed further in section 10.0 where the setting of water quality objectives against a common classification system addressed. The standard of minimum flows and water quality objectives that are set will reflect the value which the region places on its environment, which is currently very low. Although there is recognition by the countries of the need to improve water use efficiency, there is little or no recognition that the environment as a legitimate water user and whatever savings are made should be at in part be used to improve environment conditions and not, for example, be made available for increased irrigation. The results from stakeholder questionnaires carried out as part of the WQSS pilot projects (see section 10.0) produced some interesting results including that stakeholders prioritised investment in environmental protection and drinking water supply above irrigation and industrial supply. The Consultant suggests and more

comprehensive survey at national and basin levels to determine the stakeholder opinions and wishes as part of a wider water resource/IWRM strategy.

10.4 Decision Frameworks

Determination of the decision framework as encapsulated in the legal and regulatory framework is the starting point of any IWRM planning exercise. The framework can be presented as a set of management decisions which taken at the various governance levels and need to be supported by scientific data and information and analysis. The decision framework is not static but evolves as the water use landscape changes and knowledge of the water system improves, requiring additional or more detailed monitoring and analysis programmes. However, the need for expansion of data collection programmes should constantly be challenged; ensuring they are cost efficient and fit for purpose. It should be the demand of the decision framework which dictates the extent of the supporting programmes and not, which can often happen, vice versa.

An initial question is whether the existing supporting programmes are sufficient for the current decision framework and its implementation and if not what improvements are required and at what cost. In many of the Central Asian countries, although new water codes have been developed, this hasn't been accompanied by up-grading of the regulatory infrastructure and severe implementation gaps now exist. The return to the Soviet era with its extensive monitoring networks is also not an option and should be abandoned. It is clear that investment has to be made but that the level of investment has to be balanced and sustainable. The planner may even question the wisdom of commitments such as the IWRM and River Basin Management concepts, approximation to EU legislation and Multi-lateral Environmental Agreements once the costs have been clearly established. In summary the investment programme in the first instance needs to be affordable and pragmatic.

Looking forward, the decision framework will change and develop as the water use landscape changes and as prosperity grows. As, for example, farms become larger, more industrial and more business oriented than today, important questions are raised, such as:

- Should farmers continue to have cheap, subsidised water supplies 20 years from now?
- Should farmers be fined for damaging land resources through overuse?

Industries will make greater demands on water resources necessitating the improvement of regulation and water use efficiency raising questions, such as:

- In what time scale should industries comply with water quality objectives?
- Will there be new industrial legislation and policies which pave the way for improved water use efficiency and methods of disposing of waste?

Similar questions can be asked throughout the water sector and in doing so paint a picture of future a decision framework and the support programmes required.

The following is a first attempt to systematise the decision framework for CA at the regional level; identifying key short to long-term questions to be answered by the decision makers and to show how they can be used in preparing a strategic plan and identifying the components of a decision support system.

We have approached it from two areas of concern:

- Short-Medium term (5-15 years) balance of irrigation and energy use, taking account socio-economic development and climatic change in the basin states

- Sustainable Water Resources and Affordable Environmental Protection

In analysing these two areas of concern, we have tried to identify the underlying and subsidiary questions, and, by doing so, identify an initial list of interventions needed to build a regional decision support system, including expert opinion reviews, technical assistance, institutional strengthening and training, shown in italics. It should be noted that this list does not include investment projects, such as national programmes for water supply, irrigation rehabilitation and sanitation, and that there is no prioritisation of projects. This is an initial analysis meant to show what might need to be done within the next 5-10 years. Attention is focused at the regional level rather than at the national level; however many of the activities would need supported by national component projects. Much of the data, information and knowledge are available in some form/degree but it needs to be collated, analysed and made accessible.

A third area of concern which should be considered is the long term (15-25 years) energy development aspirations of upstream basin states, raising questions such as: What are the development scenarios for hydro-power development in Tajikistan and Kyrgyzstan?; What impact would these scenarios on river flows and downstream users?; What mitigation measures should be considered?

Short-Medium term balance of irrigation and energy use, taking account socio-economic development and climatic change in the basin states

What water savings can be achieved by improving irrigation practices and what the incremental costs and labour requirements?

- How can the management of irrigation systems be improved and what level of saving maybe anticipated? *(WUA/Fed WUA development and strengthening, IMT strategies, educational programmes)*
- What savings maybe made through effective and targeted maintenance programmes *(SCADA analysis, feasibility studies on replacing supply canals with pipelines)*
- What is the water demand, is it the same as supply? Are the demand/supply figures to be believed? *(Review of water demand figures and re-establishment of cadastra. Agreements on volume based water payment, tariff setting, metering/scheduling, etc).*
- What savings can be made by changing cropping to better meet market demand, for instance from cotton to wheat? Why grow rice? *(Real vs virtual water analysis).*
- What savings can be made by rehabilitation of irrigation systems and what level of measures are economically viable in the region? *(National assessments)*
- What are the return flows and how can they be increased? (*National assessments)*
- What are the existing and future water demands in the irrigation and other economic sectors? (*Development of consistent national component based demand forecasts taking into account climate change).*

What are the socio-economic trade-offs necessary in to meet demographic growth and improved livelihoods in the agricultural sector, in each of the five countries?

- What is the minimum base production required to ensure food security and avoid annual world food market fluctuations? *(National assessments)*

- What are the optimal cropping patterns and value chains, to provide maximum economic returns? *(Expert study)*
- What potential is there for targeting higher cash value crops and the development of new markets? *(National assessments and expert study)*
- What the potential for development of processing industries – adding value to the crop.*(National assessments and expert study)*
- Rationalisation of irrigated lands – can you phase out uneconomic pumped schemes - what are the S-E costs? What is the cost of rehabilitation of salinated lands? *(Review of irrigation sector strategies and development of regional guidelines).*

What are the current and medium term energy consumption requirements assuming agreed development scenarios, including energy security, in the five states and regionally, taking into account the availability of non-renewable resources?

- How do the energy security scenarios change in relation to improved energy efficiency scenarios? *(Expert study)*
- What proportion of demand can be met by existing energy resources - renewable and non-renewable - and at what cost? *(Expert study)*
- In the medium term when and where will energy deficits occur in the five states and regionally? *(National assessments)*
- What are the development options to meet the energy deficits and what are their comparative costs - Hydro-power, energy imports and improved energy efficiency? *(Expert study)*
- What would be the impact of varying levels of hydro-power development to meet forecast deficits on the hydrological regime? *(Water resource modelling, SEAs, EIAs)*

NB: The authors are not clear the availability and extent of data/information needed to feed into these studies

Sustainable Water Resources and Affordable Environmental Protection

What are the reliable SW and GW yields in the basin based on a 1:20 year drought, taking into account return flows and climatic change?

- What are the existing 1:20 year drought yields at key locations, including transboundary locations, in the basin? *(Stochastic analysis of hydrological database, assuming that it is in place and digitised)*
- What level of demand can be met in a 1:20 year drought and how do these levels compare to the existing and forecast demand taking into account economic efficiency measures? *(Consistent water balances done on a regional basis at sub-basin level)*
- What water resource development options are there to enhance yields? *(Options report, looking at new resource development (GW/SW) and demand efficiency and management options - conjunctive use, in-basin pumped storage, revised reservoir control rules for multi-use, education programmes. Water resource planning models for the AD and SD).*
- What are the available and economic GW yields for irrigation? *(Review of GW yields and utilisation costs).*

What level of environmental protection can be afforded to the Aral Sea basin?

- Where are the environmental/ecological hot-spots in the Aral Sea basin, excluding the Aral Sea itself? *(National and regional surveys. Regular monitoring programmes established)*.
- What are the minimum required environmental flows at key locations to maintain ecological integrity? *(Updating of Soviet sanitary flows taking into account international practice – regular monitoring programmes established)*
- What minimum groundwater levels are required for the management of important wetlands.(*National surveys)*
- What is the value placed on the environment by the riparian and wider communities? *(national and community surveys)*
- What extent of the Aral Sea can be supported by the minimum environmental flows and return flows? (*Water balance model of the Aral Sea)*

What are the water quality threats and risks in the basin?

- What WQ classification of SW should be used in Central Asia and what WQ objectives should be applied? (*Agreement on classification system and review of national water quality data. Establishment of WQ monitoring and regional/national strategies).*
- What are the pollution sources (point and diffuse) in the basin which threaten GW and what improvements are required for them to meet discharge standards and WQOs? *(Pollution surveys in key locations in the basin and the development of pollution control programmes)*
- What is the WQ status of GW - particularly potable sources - and what are the pollution risks? *(Review of national data - ground-truthing surveying and monitoring).*
- What are the costs and benefits of improved WQ management? *(Expert review).*

The reader should note that this is a very initial exercise and should be seen as simply as an example of what can be done.

10.5 Recommendations

The Consultant recommends the following general steps to national water resources and IWRM planning in Central Asia:

- ❖ National review of water resources, including resource yields, component forecast demands and river basin water balances (average and drought years) taking into account environmental flows and climate change. These studies need to be done at the basin level and in a much greater level of detail than previously.

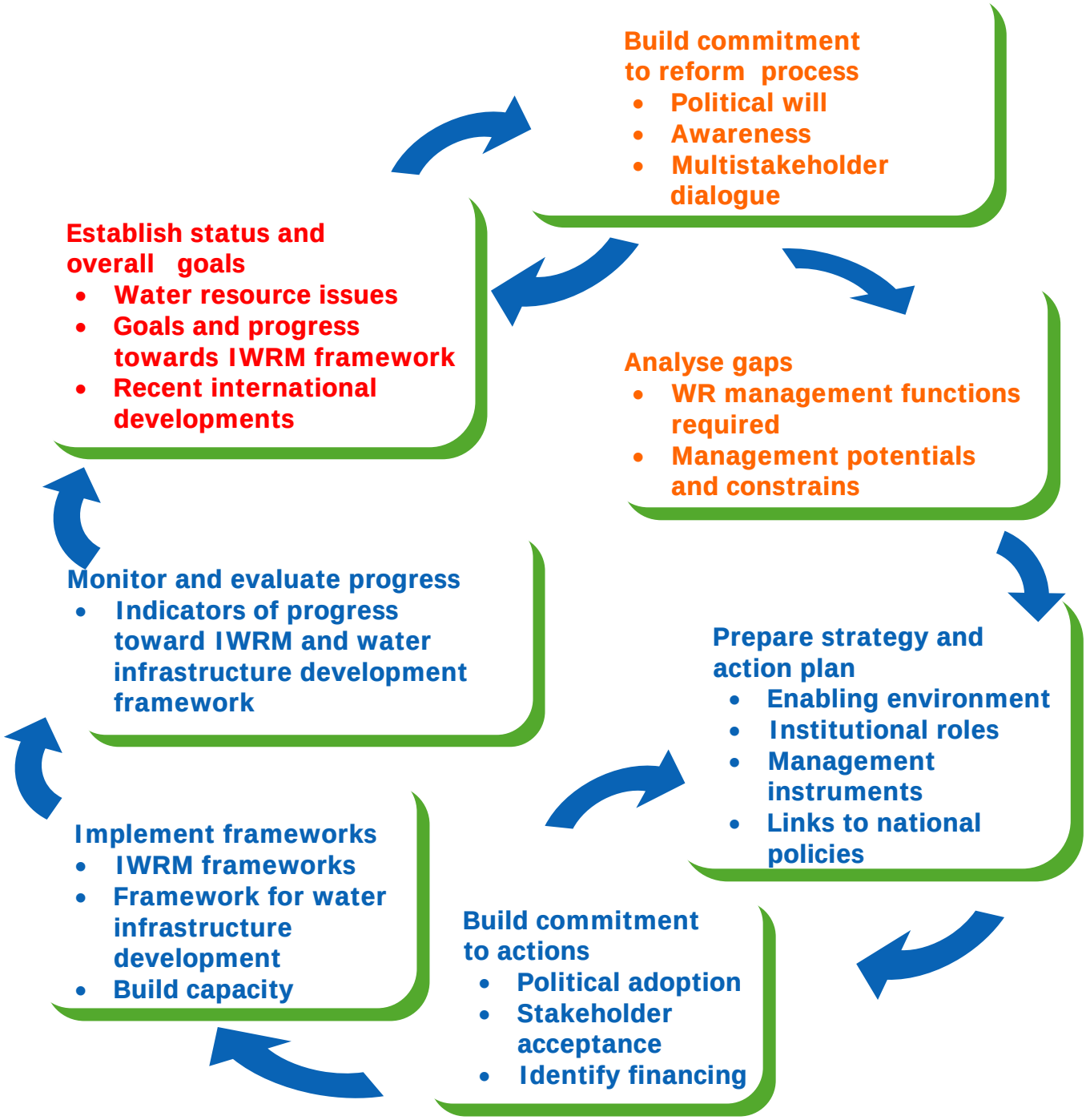
- ❖ A review of options to meet current and future deficits at basin on the demand (water efficiency) and supply sides and a long-term water resource plan, taking into account transboundary aspects.

- ❖ Development of an Irrigation Management Transfer strategy as a first step to the introduction IWRM at the basin level, with the formation of WUA and Federations and the transfer of operation of at least secondary canals.

- ❖ IWRM strategy including the establishment of a vision, determination of a decision framework, and institutional review process

- In parallel to the IWRM strategy, development and initial implementation of investment programmes targeted at strengthening governance cycle and capacity building programmes.

Figure 10.1 IWRM strategic planning process (Global Water Partnership IWRM Tool-box)



As discusse dabove, following delivery of the water resource plan and before embarking on detailed IWRM strategy countries should analyse develop a vision for IRWM implementation

(appropriate scale and extent) and determine and analyse the decision framework to be supported. These activities are shown in red in figure 13.1, which an idealised and perhaps over complicated presentation of the IWRM planning process taken from the Global Water Partnership's IWRM Tool-box.

The process clearly shows how the IWRM planning and the institutional change processes are inter-linked and how they should be implemented in parallel. It should be noted that figure 10.1 is a depiction of the planning process not the governance cycle, which is a common confusion, and that it does not include the water resource planning exercise described above and which the Consultant feels is a pre-requisite.

The national water resource plans need to be consistent and comparable and tied to a regional plan, not the ASBP III programme but a subsidiary water resource plan which would address the transboundary water resource issues, for example climate change. Ideally the national and regional plans should be developed in a parallel with a specifically designed iterative process. The water resource planning should be at a much more detailed level, with problems and issues analyzed with a greater degree of rigor than currently practiced and information provided should be challenged and tested, even if it is 'official' data. It may well be that existing data baseline is inadequate or questionable and until it strengthened, qualified assumptions and caveats will need to be made. In addition the various government and non government stakeholders to need to communicate and to openly share data and information. This is one of the central tenants of practical IWRM and the project has endeavored to bring together the major actors and encourage dialogue, with some success particularly in execution of the pilot projects. Information from donor projects and research activities need to be extracted, collated and assembled to form the best possible initial database for use by the planners.

It is almost certain that all aspects of water resource monitoring will need to be strengthened and will be key recommendation in all national plans and the regional plans to be taken up in the IWRM strategy and ASBP III and its successors. It is also important that what any programmes recommended at the national level are consistent and cost effective in meeting the requirements of the decision frameworks outlined. The determination of a decision framework is central to this exercise.

None of the countries have yet developed a River basin plan in line with the EU WFD and are someway away from doing so. Countries have set up River Basin Councils but the roles of these bodies, as discussed in section 7.0, is unclear. Without a River Basin plan upon which to consult and to act as a decision framework, the role of the RBC is very much diminished. It is important to demonstrate to the countries and region as whole the scope and detail of good river basin plan and it is proposed that in the next stage a well researched river basin, possibly transboundary, be used as a model.

11.0 Theme 5: Capacity building and Training

Under this theme the project has undertaken a number of thematic workshops and trainings, in which as wide a spectrum of stakeholders was present as possible, in order to better understand each others functions and mandates and, hopefully, to see how by working together can make their jobs easier and more efficient. In the pilot projects we adopted an on-the-job training approach, encouraging Ministries of Water Resources and Ministries of Environmental Protection, with some success.

The following section provides brief details of the training given by the project at the national and regional levels. The training materials in their entirety and training reports are provided in Annex 6.

Regional Training Course on Water Quality Monitoring, Kyrgyzstan

The Project's first regional training workshop, over five full days it covered the base conventional and biological monitoring techniques to be practiced in the pilot projects. The course was held on11-15 May 2009 at the Hotel Urmat Ordo, Bishkek, Kyrgyzstan with field trips to the River Chu. Ten specialists, chemists and biologists from state laboratories and Hydromet services of four beneficiary countries participated in the training.

The main trainers were Jaroslav Slobodnik and Emilia Elehova-Misikova, who provided a wealth of knowledge on broader EU monitoring legislation/practices from their experience of establishing monitoring programmes in the Danube Basin. Bill Parr, the Project's Water Management Specialist, was present throughout the week to help answer questions and aid in discussions, as was Lidya Kustareva for the Kyrgyz Academy of Sciences, who assisted with the biological monitoring and invertebrate identification. The training included lectures on biological and chemical water quality monitoring, and practical sessions in sample collection and analysis. The each country was given two binocular microscopes, nets and other miscellaneous equipment, required for the biological monitoring.

Additional on-the-job training was provided through on-the-job training as part o the two WQMS pilot projects on the Rivers Vakhsh and Chu. It was the intention to use the training provided in this event in the pilot projects, and therefore use the pilot projects for additional training. In particular, it was hoped to use the training and pilot projects for the introduction of biological monitoring to four beneficiary countries, via training on EU-type biological monitoring, using lessons learned from the biological monitoring being undertaken by Eastern Kazakh Hydromet. In addition the trainees it was hoped to show how the different types of monitoring could be used to provide an integrated assessment of both historical and current water status.

Regional Integrated Water Resources Management Training, Tajikistan

The IWRM Training Course delivered on the 3rd, 4th and 5th of June 2009 in Mercury Hotel, Dushanbe, Tajikistan, was expected to underpin the process of water management improvement and help the participating countries increase their understanding of IWRM and the challenges in its delivery. The regional IWRM training was intended for Government officials of relevant Ministries and departments (Environmental Protection organizations, Water Departments, Hydromets, Ministries of Geology and Health) from beneficiary countries. The training was structured to provide numerous break-out sessions and planning exercises in the context of IWRM. Fourteen representatives of three countries (Kyrgyzstan, Kazakhstan and Tajikistan) participated in the training. The main trainer was international consultant Martin. J. Bloxham. Bill Parr the Project's Water Management Specialist gave

one-day training on European Union Water Framework Directive and how addresses River Basin Management and relates to IWRM.

Regional Training on Economic Instruments, Kazakhstan

The regional training on Economic Instruments application in the water sector was conducted in Kazakh Hydromet premises, Astana, 22-23rd of October, 2009. The training objective was to provide staff from ministries and other public agencies involved in water management with a basic knowledge and understanding of the key requirements and practical considerations involved in planning, preparing and applying economic and financial instruments in the water sector.

The twelve participants from 3 countries: Kyrgyzstan, Tajikistan and Kazakhstan attended, representing Water Departments, Environmental Protection and Land Resources Management Organisations. The workshop was prepared and delivered by a training team comprising: Michael Betts (GB): Economist & Lead Trainer, Malkhaz Adeishvili: Environmental Management and Policy Expert & Trainer, Andrzej Guła (PL) Financial expert: Economist & Trainer. The course included a section on the development of regional economic instruments but this proved not to be of great interest to the audience and more time was spent on the financial aspects of water management including tariff setting. Technical assistance was also provided in the development of concept/proposals for an Environmental Fund in Kazakhstan.

Regional Training on Public Participation in Water Resources Management, Kyrgyzstan

Public participation in Water Resources Management training was conducted in the Project Office, Dordoi Plaza Business Centre, Bishkek, Kazakhstan 8-9th December, 2009. Representatives from government and non-government organizations took part in the training. Public participation is a two way process with the government providing information and assist the public sector. Sixteen people from three Central Asian countries participated in the training: 8 people from the main beneficiary organisations of Kyrgyzstan, Kazakhstan and Tajikistan and 6 people from NGO's of Kyrgyzstan and Tajikistan.

The training was delivered by International Public Participation Expert Paula Orr, who has experience in the design and development of national public participation procedures in the United Kingdom as part of the implementation of WFD and River Basin planning. The course programme was designed to provide information about the practical application of public participation in the context of water governance. The programme included presentations, case studies, discussion sessions and group exercises. Participants were encouraged to ask questions and explore how the information could be applied in their own work.

National Seminars of Economic Instruments, Kyrgyzstan and Tajikistan

Two national seminars were conducted to discuss the Kyrgyz and Tajik reports on Economic Instruments at the project office, Dordoi Plaza Business Centre, Bishkek, Kyrgyzstan on 14th October; and in the offices of the Ministry of Water Resources and Melioration, Dushanbe Tajikistan on the 27th October, 2009. The objective of the seminars was to discuss findings and recommendations related to the use of economic instruments for water resources management and the findings of the pilot projects.

The seminars were led by Malkhaz Adeishvilli, Project Economic Instruments Expert. In Kyrgyzstan eight participants attended, including representatives from the Ministry of Economic Development and Trade, Department of Regulation of Paid Services, State Agency on Anti-monopoly Policy and Development of Competition, Ministry of Health, State

Agency on Geology and Mineral Resources, Hydromet, Ministry of Industry, Energy and Fuel Resources, Water Department and State Agency on Environmental Protection and Forestry.

The Tajikistan Country Workshop on Economic Instruments for the Protection and Sustainable Use of Water Resources was organized with the support of the Ministry and the Institute of Hydrology and Melioration. The seminar was attend by representatives of different governmental organizations and academic institutions, including the Ministry of Water Resources and Melioration, Department of Hydrometeorology, Institute of the Agriculture Economy and Institute of Hydrology and Melioration.

National Training on EU Water Framework Directive, Kazakhstan

The National training on EU Framework Directive was undertaken at the offices of the Hydro-meteorological services in Astana, Kazakhstan on 4th November 2009. The training was conducted by Bill Parr for 11 participants from the Ministry of Environmental Protection, Water Resources Committee, Agency of Land Management, Committee on Sanitary-and-Epidemiological Control, Ministry of Industry and Trade, Agency on the issues of construction and municipal economy, Hydromet, and the Hydrogeology and Engineering Geology of the Geology Committee.

It is hoped that similar training can be replicated in the other Central Asian states when funding is made available.

National Seminars of Legislation and Institutions, Kyrgyzstan and Tajikistan

The national seminars to review the findings and recommendations of the legal and institutional reviews in Bishkek, Kyrgyzstan, 24th of June and in Dushanbe, Tajikistan on the 2nd of December, 2009. No seminars were requested in Kazakhstan or Turkmenistan by the beneficiaries. Jitzchak Alster, Regulatory and Institutional Reinforcement Expert led the seminars the purpose of which was to discuss and review the recommendations for amendments to the country water codes and institutional structures for IWRM implementation.

The nine participants attended the seminar in Bishkek, including representatives from the State Agency of Environmental Protection, Agency on Geology and Mineral Resources, Institute of Water Problems, Hydromet, Ministry of Health, Ministry of Industry and Energy, Ministry of Foreign Affairs and NGO BIOM.

In Dushanbe, eighteen people attended the seminar, including representatives from the Ministry of Land Reclamation and Water Resources, Ministry of Health, Water Department, Hydromet, Geology Department and various NGO's.

12.0 Theme 6: Regional Cooperation Activities

In the context of regional collaboration focus has been on the Aral Sea basin, which lies in the territories all four participating countries, and other major transboundary basins such as Balkhsh, Ural and Caspian have not been addressed.

The work undertaken by the project in support of regional cooperation has been varied, and has included:

- Establishment of Donor Coordination group and the organisation and chairing of two meetings in November 2008 and May 2009. The coordination group has provided a forum for donors to develop joint activities and to avoid duplication at the national and regional levels. At the first meeting the donors became familiar with each others projects and at the second meeting a common regional approach was discussed in particular support to EC-IFAS which re-located to Almaty in early 2009. Since October 2009 EC-IFAS has taken over responsibility for regional donor coordination and has established an Aral Sea Basin Plan III Donor Advisory Group of which the project team leader has been made a member.

- Assistance to the EC Project Manager in the coordination between EC regional water sector projects including CAREC harmonisation of water quality standards and norms, EC-UNDP IWRM programme for Central Asia and the National Policy Dialogue (NPD) on IWRM in Kyrgyzstan.

- Attendance at the NPD in Kyrgyzstan and the Chu-Tallas Commission meetings and technical support in the fields of legal and institution reform and water quality management.

- Development of proposals for re-structuring and strengthening of EC-IFAS and associated technical bodies as input into block 1 of the EC-IFAS workplan.

- Draft workplan for the development of the Aral Sea Basin Plan (ASBP) III which was submitted EC-IFAS and provision of Ad hoc advice on workplan implementation at ASBP III structure.

- Ad hoc advice to the EC project manger on donor coordination and regional water management issues.

- Whilst implementation of the River Chu water quality pilot project, establishment of transboundary monitoring and evaluation teams from the laboratories in Kyrgyzstan and Kazakhstan.

- Working with closely with CAREC and OECD on development of a Central Asian regional water quality management system and river classification.

- Providing logistical, financial and technical support to the WB and WMO in the organisation of the regional hydro meteorological services conference held in Tashkent, Uzbekistan in October 2009.

Regional cooperation received a boost with the re-location of the Executive Committee of IFAS from Tajikistan to Kazakhstan and the agreement in April 2009 by the Heads of States to improve IFAS' working efficiency. Since that time the UNECE has been working very closely with IFAS to garner donor support and assist IFAS in preparation of a twelve month workplan, now in implementation, to look at the options for institutional reform and to prepare

the Aral Sea Basin Programme III (2011 -2016). To this end the EC-IFAS is currently receiving technical assistance from the EU, GtZ, UNECE and USAID and in future assistance the World Bank.

Whatever the final re-structured IFAS emerges, its effectiveness in the water governance needs to be improved and functions and inter-relationships of EC-IFAS and its associated bodies need be clearly defined. Regarding the functions of EC-IFAS, as at the national level, the decision framework needs to be defined and scope of a decision support system specified. To this end, the Consultant suggests a list of possible functions of EC-IFAS below:

- provision of decision support to IFAS, including interpretation and presentation of findings of technical bodies/institutions
- coordination of work of the technical bodies/institutions
- coordination and monitoring of ASBP III implementation
- financial oversight
- donor coordination
- project development support
- maintenance of an ASB information system – not we can achieve a centralised system at present, may have to live with a distributed system accessed through EC-IFAS – CAwater.
- out-reach programme (could be out-sourced)

It should be noted that these functions do not include, with the exception of the outreach programme, the direct implementation of any projects, but rather the analysis, coordination and oversight of the work done by associated technical bodies. The technical work associated with the decision support would be done by existing associated bodies and other bodies working currently outside IFAS remit, for example the Electricity Despatch Centre. The work would be coordinated through a series of working groups including:

- Water resources
- Water demand
- Energy demand
- Water Quality
- Environmental protection
- Emergency response
- Public participation

The findings of the working groups would be synthesised by a high level working group supported by EC-IFAS and feeding advice directly to the IFAS management board. It is hoped many the elements needed to build such a system, which similar to that which operates under the Danube Commission, including computer models, could be identified in ASBP III and be supported by the donor community to be in place by 2015. The building of a strengthened regional structure should be a major focus of attention for the donors over the next five years. The countries must decide want responsibility they are going to give and invest in IFAS and its technical bodies such as SIC – ICWC. How is water quality and water quantity to be integrated, GW and SW management combined, and the different demand sectors (in particular hydro-power) reconciled? However, this is a work in progress and it is not appropriate for the Consultants to develop any further details in this report which might pre-judge the on-going interstate consultations regarding the new IFAS structure and development of ASBP III.

The status water resource planning, which at the national level, as discussed above is poor and has a long way to go before it can provide a coherent picture. Ideally, each country would provide its own national plan based on consistent water resource and demand

assessments, which would be then combined and rationalised into a regional plan, but the lack of such plan at present is a major stumbling block to longer term IWRM implementation.. As discussed there needs to be a clear understanding of the water resources and demands before a vision for IWRM can be developed.

The calculation of the water balance is done on an annual basis and is undertaken historically by the River Basin Authorities, based on information provided by the hydrometeorological services, but doesn't believe that, with the exception of Kazakhstan, this is being done with any degree of reliability. The calculation of the regional water balance is undertaken by the Science and Information Centre of the Interstate Commission for Water Coordination (SIC-ICWC) based in Tashkent which reports to the management board of IFAS. The consultant has been unable to visit SIC-ICWC and establish the exact the methodology used to determine the water balance and much of the following gleaned from the web-site and consultations with regional planners and there do seem to be some short-comings in the procedures.

The SIC-ICWC sets abstraction limits on an annual basis at the beginning of the growing season, which are updated three months into the season, based on a prescribed methodology. The details of the methodology are not known to the Consultant and are not available on the ICWC web-site, but should take into account the depth of snow fields (not clear whether currently monitored) and predicted run-off and the storage in the system from the previous season(s). Whether any stochastic analysis is also undertaken is unclear, although the web-site does refer to average and dry years. Actual abstractions figures month by month as well as releases from the regulating reservoirs in the two river basins Syr Darya and Amu Darya are recorded by the states and submitted to SIC-ICWC. It is known that the monitoring of actual abstractions in some countries is unreliable and it is understood that SIC-ICWC do factor this in their calculations.

Availability of data from the SIC - ICWC and CAWATER web-sites is patchy. The SIC-ICWC web-site shows the abstraction limits and actual figures in both basins at various points on an annual basis for the growing and non-vegetative seasons. It also holds the annual SIC - ICWC reports the board and well as considerable background information about the Aral Sea. A limited description of a water resource model is available on the web-site but it is not clear how it is used, if at all, to calculate abstraction limits. It is a relatively old model that was developed by the University of Texas and has, it is understood, been up-dated. The model is a social-economic model for which up-to-date data is required and it is unclear whether this information is available or not, certainly the water demands figures may not be available. It is also understood that this model has been since superseded by its developers, the University of Texas, but it not known whether this updated model is being used by SIC-ICWC. There are various summary analysis displayed on the site but it is unclear how and from where these analysis have been supported.

The most recent annual report 2009 of SIC-ICWC records problems on the Syr Darya in particular in the Fergana Valley of under release of water in the beginning of the year from Toktogul reservoir. Despite a previous wet year and adequate storage water, releases were held back to meet hydro-power demand for the forth-coming winter period. Later in the year more water than required was released causing additional problems. The SIC-ICWC doesn't have information about forecast power demand and was not aware of the potential conflict of water use early in the season when setting limits. This lack of knowledge of the power demands set up a problem which could have been avoided if there had been closer collaboration between the irrigation and power generation sectors regionally.

Regarding water quality, there are summaries of salinity inputs into the Aral Sea and some analysis of salinity in the lower Amu Darya on the SIC-ICWC web-site. It is again unclear where these data have been sourced and therefore their veracity. There appears to be no

data on any other contaminants in the system or any information about levels of pollution in the middle and upper reaches of the two basins. This is probably not surprising, as both the present project and the CAREC harmonisation of water standards found it impossible to gather any ambient water quality data for the two basins and the countries, when pressed have admitted that little or no monitoring has taken place in recent years and that there is no baseline upon which to develop any planning framework. It is understood that Kazakhstan has an Altas showing water quality status in all their waters, but this has not been made available and it does not explain the lack of current ambient data.

There are no GW resource figures available on the web-site. It is understood that the GW resources are not fully utilised probably because of their expense in pumping; commonly it is quoted that only 10-20% of available GW resources are utilised. Their impact on return flows is not measured and although there is discussion on inter-connectivity in the ICWC web-site the results are less than convincing. The potential for conjunctive use is not discussed. It should be noted that Public water supply is mainly sourced from GW and through the WWTW ends up in the surface water system or in surface water aquifers.

There are no environmental data on either of the SIC-ICWC or CAWATER web-sites. These data maybe held by the Scientific Information Centre of the Interstate Commission for Sustainable Development in Ashgabat, but this organisation has no web-site and therefore any data are readily assessable.

To access the SIC-ICWC database you are directed to the CAWATER web-site and are required to register. However, the database once accessed would appear to be populated with data going back as far as 1985 and it is suspected that much of the data is sourced from the last Soviet assessment of water resources undertaken during Perestroika. Generally there is a lack of transparency in the workings of the SIC-ICWC. It is not clear where the irrigation demand data, particularly from WARMAP I, II and III, and the recent flow data provided by the hydrometeoroligal services is held on the database; the Consultant could not find them.

The Consultant recommends that the regional water resource planning process undertaken by SIC-ICWC be reviewed and a longer term perspective be adopted. At present it operates only in the short-term providing operational data for the irrigation sector and doesn’t address the other users and need for environmental protection.

13.0 Next Steps

13.1 Enabling Environment

The recommendations for amendments to the water codes are given in the national legal and institutional reports, Annex 1, and are not repeated here. There are a number of general points to be addressed to bring the legal and institutional frameworks in line with the principles of IWRM, including:

- Legislation should shift from resource use management to sustainable resource management and the codes should regulate the planning process, including the planning unit (basin), the content of the plan (water, land, population, economic activities etc.) the legal force of plans, integration of plans prepared by different sectors, participants in planning processes and the manner in which plans are prepared and approved.

- The regulator role of the Government in water resource management, in particular in the irrigation sector, should be separated from the operational role. It is envisaged that the operational functions would be transferred to the private sector under an Irrigation Management Transfer programme, with transfer initially to the Water User Associations. The Water Codes and/or ministerial regulations should be amended to enforce this change in management.

- Integrated Water Resource Management (IWRM) is first and foremost, as explained, a process of integrating existing planning and management and assumes that there is a coherent water resources management in place. However, the Water Codes do not always support this; for example, none of the Codes assigns the basic management and planning functions to the water authorities. In addition to the absence of a planning mechanism, water use does not always require a license. While in all countries special water use (i.e. water that is abstracted by mechanical means) requires a license, in practice such water licenses are rarely issued. In order to obtain a sound water management decision process the Consultant would recommend that the Water Codes be amended by including that one body, preferably with jurisdictions over all aspects of water resources (an integrated water resource agency), be formally assigned responsibility for all aspects of water resource management; and that inter-agency consultation, coordination and agreement be required for all decision affecting other ministries or agencies, including policy decisions.

- The integration of water quantity and water quality is pivotal to IWRM and needs to be undertaken at both institutional (coordinated or integrated institutions) and statutory levels. The Water Codes need amending to ensure that all water resource use planning and allocations take into account the impact on water quality, and vice versa that all discharges take into account their effect on water uses at the point of discharge and downstream. To this end, the Consultant recommends that the Water Codes be amended to transfer the responsibility for ground water resource management from the geological to the water authorities.

- River basin management needs to be introduced through legislation and in this respect the Consultant recommends that the Tajik and Turkmen Codes be amended to allow using the river basin or river sub-basin as the planning and perhaps management unit.

13.2 Water Quality

The systems of water quality monitoring and management are in a weak condition throughout Central Asia and their recovery and effectiveness is hampered by overly ambitious expectations from the Soviet era. There is a paucity of data required for robust environmental management of the pilot areas, with the situation being considerably worse for the Vakhsh than the Chu. Neither national nor oblast-level collation provides a sufficiently detailed overview of agricultural status/management to feed into river basin management planning.

Water continues to be managed overwhelmingly in terms of quantity, rather than quality, with only scant attention paid to environmental management – albeit more so in Kazakhstan than the other 'pilot countries.' However, the river flow gauging networks are not suitable to fully understand the flow of water through the catchments, and less information is known about groundwater resources than surface flows. Almost no attention has been paid to the estimation of return water flows and ecological flows (one of the tenets of IWRM) have not been established. Agriculture (irrigation) is overwhelmingly the main use in both pilot areas.

Serious concerns exist over the quality of water/sediment data collected. The improvement of existing analytical quality control/quality assurance programmes should be pursued. Likewise, there are concerns over continued national funding of existing monitoring programmes for which further equipment/training is required. There are too many government organisations involved in monitoring, with a lack of cooperation between them. It would be better to have a single adequately equipped and funded laboratory with well-trained staff than numerous poorly funded and ill-equipped laboratories.

The Consultant recommends the wider trialling of the proposed WQMS and its testing within a basin-based management and planning exercise with the objective, with the support of IFAS, of regional adoption of the system and its use as the WQ planning framework. To achieve these next steps would require countries to strengthen their capacities in a number of key areas, including:

- Mapping and data collection
- Waterbody identification and characterisation
- Water resource assessment
- Monitoring
- Setting environmental objectives
- Pressure-impact analysis
- Economic analysis
- Agricultural management
- Conjunctive use of surface and groundwaters
- Development of a programme of measures to improve water status

Further details are given in the pilot project reports in Annex 4.

All these activities are in line with IWRM and the EU framework Directive and should be underpinned by a comprehensive training programme and re-equipping of the major laboratories. The most important activity is the final one listed, the development of a series of measures to improve water status to be achieved through River Basin Planning. The Consultant recommends that a pilot River Basin plan be developed on the River Chu with the support of the Chu-Talas Commission as part of a large pilot project.

The pollution control aspect has not been directly addressed by this project, but it is clear from the pilot project on pollution charges (annex 5) under taken under theme 3, that the

existing systems do not provide any incentive to reduce pollution and are subject to abuse. It is recommended that the current systems are simplified and that policing and enforcing are strengthened, with the necessary capacity building and investment programme as part of the introduction of any new WQ planning framework. Also, the system of permitting/licensing needs to be reviewed and perhaps completely recast as indicated above.

13.3 Economic Instruments

The detailed recommendations for amendments to system of economic instruments are given in the national and pilot project reports, Annexes 4 and 5, and are not repeated here. However, there are a number of general recommendations and proposals, including:

- The system of water pollution charges used in CA countries is poorly designed, cannot be properly enforced and fails to implement the Polluter Pays Principle. It would be difficult, if not impossible, to recommend a set of specific changes/revisions which would correct all deficiencies identified in the system and make it effective tool for addressing water pollution problems in CA region. A comprehensive reform of the system is needed. Moreover, there should be conducive legal, policy, institutional, economic and financial frameworks in place. These reforms and conditions, however, seem less realistic to be implemented and achieved in the region in the short term. The Consultant, as an alternative option would be to simplify the current system of water pollution charges and attempt to enhance their environmental effectiveness, revenue raising function and administration to the extent possible. This could be achieved by:

- Reducing the number of pollutants charged;

- Increasing the charge rates;

- Improving charge enforcement and monitoring.

More details on how the water pollution charges could be revised are provided in the concept paper *Revising the System of Water Pollution Charges in the Republic of Kyrgyzstan* prepared under the WGCA project as a pilot project exercise (see Annex 5).

- As an essential step, authorities responsible for water resources management should build information systems to ensure collection of data on the amounts of water used in different sectors, charge rates and revenues collected. This would make it possible to gauge to what extent the charges affect water use efficiency or whether it would be appropriate to revise the charge rates, increasing their incentive or revenue raising effect. In the long term, water abstraction charges should achieve levels that encourage water use efficiency improvements and water saving.

- Tariffs below cost recovery levels, poor tariffs collection and the absence of metering encourage wasteful use of water resources in irrigation sector, undermine the maintenance of the infrastructure and hamper the efficiency improvements all across the CA region. The irrigation infrastructure will continue to deteriorate unless urgent institutional and tariffs' reforms are undertaken. Governments should set a policy objective to increase the tariffs to achieve recovery of costs of operation and maintenance of the irrigation systems. It is recommended that they elaborate plans and financing strategies drawing a clear picture of the current state of the irrigation infrastructure and setting realistic objectives for improvements and developments. They should also assess the gaps between available and needed resources for

achieving the objectives, and identify financial sources for covering the gap in a certain period of time. The sources would include tariffs paid by farmers, governmental subsidies, international concessional loans and commercial funding.

13.4 Water Resource and IWRM planning

There is a need to establish a common IWRM planning process in Central Asia beginning with consistent water resource plans. The Consultant has proposed a set of steps towards the IWRM; the speed of implementation of which and final end point will not necessarily be the same in each country. The planning steps should not be considered implemented sequentially but rather in places in parallel, with the planning process incorporating an institutional reform process leading towards IWRM and investment programmes targeted at strengthening the governance cycle, particularly the monitoring and analysis components. The proposed common steps are:

- National review of water resources, including resource yields, component forecast demands and river basin water balances (average and drought years) taking into account environmental flows and climate change. These studies need to be done at the basin level and in a much greater level of detail than previously.
- A review of options to meet current and future deficits at basin on the demand (water efficiency) and supply sides and a long-term water resource plan, taking into account transboundary aspects.
- Development of an Irrigation Management Transfer strategy as a first step to the introduction IWRM at the basin level, with the formation of WUA and Federations and the transfer of operation of at least secondary canals.
- IWRM strategy including the establishment of a vision, determination of a decision framework, institutional review process, and wide ranging stakeholder consultations
- In parallel to the IWRM strategy, development and initial implementation of investment programmes targeted at strengthening governance cycle and capacity building programmes.
- Underpinning capacity building and training programmes

The establishment of a decision framework will assist the countries in deciding on the speed and depth to which they can afford to implement IWRM. The Consultant would recommend that the process be articulated through the National Policy Dialogues established or being established in three of the countries (Kyrgyzstan, Tajikistan and Turkmenistan) and that coordination be undertaken regionally by EC-IFAS. This will help to ensure all key stakeholders, government and non-government, are involved in the process. For it to be successful there should needs to close cooperation and coordination not only between the countries but also the donors; is often the donors' differing development and political agendas which are the root cause of national policy fragmentation both intra and interstate. To this end, the strong regional donor coordination by EC-IFAS is to be welcomed and encouraged by all parties.

In some states, in particular Tajikistan and Turkmenistan, the development of an IWRM strategy may be too early and development and implementation of an Irrigation Management Transfer Strategy should be taken as a first step; building upon the programmes of Water

User Association development under taken by various donors and allowing countries to determine what is and what is not possible regarding IWRM implementation.

Although the development process and structure of the original Kazakhstan IWRM and Water efficiency Strategy were admirable, the Strategy's aims and objectives were seemingly too ambitious, even for Kazakhstan which is a relatively rich state, and it has not received the political and crucially financial support it deserved. The Consultant now sees the final version of the Strategy as a blockage rather than an enabling instrument to IWRM implementation and would suggest that Kazakhstan consider undertaking a Water Resource Plan, based on UNDP review, and to repeat the IWRM planning exercise, focusing on the decision framework and IWRM vision.

13.5 Training and Capacity building

A comprehensive training and capacity programmes need to be established for all the above activities, which the Consultant suggests should have full donor by-in and should be coordinated regionally. The training programme should cover not only technical subject but also general management training, including accounting, personnel time-management and IT. The technical training should be more specific addressing particular aspects of IWRM implementation, such as operation of Water Councils, river basin planning decisions frameworks, conjunctive use, public relations, moving away from the theory to the practical. Training should be tied to activities/pilot projects and support a learning-by-doing process. A training of trainers programme should be initiated. The training programme should be seen not as a bolt on component but rather a driver of the planning process at the national and regional levels. The current proposals for a regional training centre developed by SIC-ICWC could be investigated.

13.6 Regional Cooperation

The next steps at the regional cooperation are being explored by EC-IFAS as part of the ASBP III development and the Consultant does not wish to pre-judge that final document; however, we would like to high-light a number of activities which warrant particular support from the donor community, these are:

- Regional water resource planning – development of water resource (SW and GW) balances for the Syr Darya and Amu Darya basins, including for analysis of demands (irrigation, energy, industrial, municipal and environmental) and a review of demand and supply side options for meeting existing and forecast deficits.
- Decision framework and decision support system – determination of regional decision framework and construction of a decision support system and its components
- Preparation and agreement of regional guidelines for water quality, environmental protection and climate change
- Development and implementation of a regional training programme (see above)