Kazakhstan National Integrated Water Resources Management & Water Efficiency Plan

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List of Abbreviations

ALRM	Agency for Land Resources Management
CEP	Committee for Environmental Protection (National)
CGSS	Committee for Geology and Sub-Soils (National)
CWR	Committee for Water Resources (National)
DEP	Department of Environmental Protection (Oblast)
DoG	Department of Geology (Oblast)
EUWFD	European Union Water Framework Directive
GOSSTANDARD	State Standards Organisation
IFI	International Funding Institution
IMWG	Interministerial Working Group (National)
IWRM	Integrated Water Resources Management
MoA	Ministry of Agriculture
MEMR	Ministry of Energy and Mineral Resources
MEP	Ministry of Environmental Protection
MES	Ministry for Emergency Situations
ME&S	Ministry of Education and Science
MFA	Ministry of Foreign Affairs
MoH	Ministry of Health
MIT	Ministry of Industry and Trade
MoJ	Ministry of Justice
NWIC	National Water Information Centre
RBC	River Basin Council (River Basin)
RBO	River Basin Organisation (River Basin)
RSE	Republican State Enterprise
SES	Sanitary and Epidemiological Services (Oblast)
SSWM	Sub-Soil Water Monitoring
UIF	Unified Information System

Summary Table

Given the nature of a plan such as this one, it is not possible to prepare a meaningful summery. Each section is a separate component of the overall plan, even though they are also interconnected. Section 18 provides a set of detailed tables with each of the activities, their objectives, responsibilities and a cost estimate where possible.

At the end of Section 18, Table 18.11 provides a more graphical presentation summarising the preceding Tables 18.1 through 18.10.

Below is a further summary table indicating the main elements of the National Integrated Water Resources Management and Water Efficiency Plan for Kazakhstan.

Summary Table of Initial Steps in Implementing the National IWRM and WE Plan in Kazakhstan

Plan Section	Steps in Establishing IWRM in Kazakhstan	Primary Responsibility *	2006				2007				2008				2009				2010				Cost Estimate (mKZT)
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
5	**Improve Overall Governance in IWRM**	CWG, CG																					
5.1	Finalise and Approve National IWRM Plan	CWR	X																				2
5.2	Prepare a National Water Policy	CG, CWR				X																	10
6.1, 7.1	Increase the Authority of CWR	CG										X											23+
6.2	Increase the Authority of RBOs	CG										X											2
6.3	Establish and Support RBCs	CG, CWR, LA				X																>	156
6.4	Decrease Fragmentation in Water Management Functions	IMWG, CWR				X																	2
6.5	Coordinate the Legal Foundation in Water and Environment	MoJ, CWR								X													12
6.6	Rationalise public sector salaries	CG																				>	NC
6.7	Rationalise financing for water management	CG																				>	NC
																			Total				**207+**
7, 8, 9	**Rebuild Capacity in Water Management**																						
7	Rebuild Capacity in CWR	CG, CWR																				>	45
7.2, 7.3	Establish the National Water Information Centre	CG, CWR, MEP						X															30
8	Rebuild Capacity in RBOs	CG, CWR, RBOs																				>	6757
9	Establish and Develop Eight RBCs	CG, CWR, RBOs																				>	156
																			Total				**6988**
10-13	**Rebuild and Strenghten Monitoring and Information**																						
10	Rebuild Capacity in Surface Water Monitoring	MEP																				>	16328
11	Rebuild Capacity in Groundwater Management	MEMR																				>	856
12	Improve Land Management and Monitoring	ALRM																				>	4121
13	Improve Information Management	CWR, RBOs																				X	1037
																			Total				**22342**
14	**Improve Education and Public Awareness**	CWR, MEP, ME&S																				>	
																			Total				**1924**
15	**Institute the Management of Water Quality**	CWR, MEP																				>	
																			Total				**NC**
16	**Improving the Efficiency of Water Use**	CWR, MoA																				>	
																			Total				**NC**
17	**Improving Transboundary Water Cooperation**	CWR, CG, MFA																				>	
																			Total				**NC**

Central Government	CG	Ministry of Energy and Mineral Resources	MEMR
Committee for Water Resources	CWR	Agency for Land Resource Management	ALRM
River Basin Organisations	RBO	Minstry of Justice	MoJ
Local Administration	LA	Ministry of Education and Science	ME&S
Ministry for Environmental Protection	MEP	Ministry of Agriculture	MoA
Ministry of Foreign Affairs	MFA	NC = Not Calculated	

1 Introduction

1.1 Context of the UNDP Project

The Committee for Water Resources has been assisted in the preparation of the Kazakhstan National Integrated Water Resources Management (IWRM) and Water Efficiency (WE) Plan by the UNDP through the 'Project for a National IWRM and Water Efficiency Plan for Kazakhstan'. Its main funding is from the Government of Norway, with additional financial assistance from the UK Department for International Development and assisted by the Global Water Partnership (GWP).

The project started in June 2004 and much of the first nine months were taken up in stakeholder consultations and developing the approach to IWRM in general and the National Plan in particular. This period culminated in the completion of the Concept Note for the National IWRM and WE Plan in March 2005. The Concept Note was widely distributed among many stakeholders. Some comments were returned and these have been considered in the preparation of this Draft National IWRM and WE Plan. The Concept Note retains its importance because it presents significantly more background on the problems in water resources management in Kazakhstan. This is in contrast with the Draft National Plan which focuses on change for the future.

Following the completion of the National Plan the Project will continue to support and assist the CWR in other, related project objectives including the preparation of River Basin IWRM and WE Plans for the eight river basins of Kazakhstan. These are a necessary follow-on from the National Plan as they will define a programme of actions required at the river basin level. The first principle of IWRM is that the river basin is the correct unit for water resources management. River Basin Councils (RBCs) are also being established in all eight river basins with the support of the project. Support will continue for the duration of the project which ends in June 2007.

1.2 Ownership and Implementation of the National IWRM and WE Plan

The National IWRM and WE Plan is to become a document of the Government of Kazakhstan and executed through the Committee for Water Resources (CWR) as the appropriate implementing agency. Other ministries will also have a close involvement in the continued development and implementation of the Plan, as water resources management affects all aspects of life. These ministries include, but are not limited to:

- Ministry of Agriculture
- Ministry of Economics and Budget Planning
- Ministry of Energy and Mineral Resources
- Ministry of Emergency Planning
- Ministry of Finance
- Ministry of Environmental Protection
- Ministry of Health

The Government of Kazakhstan, through its Cabinet of Ministers, needs to activate these ministries to increase their involvement in the establishment of IWRM.

It is important to recall that there is a new Water Code in Kazakhstan, passed in July 2003. The Water Code continues to undergo amendment and evolution into a stronger piece of legislation, but it does contain many elements reflecting the principles of IWRM. To date, however, very little has been done to implement the Water Code and now there is a growing list of conflicts with other, some newer, laws. However, the implementation of the National IWRM and WE Plan can be practically seen as implementing the Water Code.

The National IWRM and Water Efficiency Plan outlines the actions needed at the national level to implement and establish the principles and practice of IWRM in Kazakhstan. Under the first principle of IWRM, it is at the river basin level that most water resources management activity takes place. Developing and strengthening these activities will be detailed in the eight River Basin IWRM Plans which will be prepared in 2006-2007. The National IWRM and WE Plan is necessary as a first step because the decisions to authorise the RBOs need to be made first at the National level.

1.3 The Need for IWRM in Kazakhstan

Kazakhstan must live with the water supplies it currently has and be prepared for less. No matter what actions may be taken in international agreements they are very unlikely to result in an increase in cross border flows. Rather, international agreements on the transboundary rivers are about water security; allowing confidence in water resources to support planning for investments and operations. Additionally, most studies of climate change suggest a decline in available water over the coming decades due to global warming and the resultant shrinking of the glaciers that feed the main rivers of the region.

At the same time Kazakhstan wastes a significant proportion of its water resources through both inefficient use of water and through pollution.

Overuse of irrigation water wastes water, but also results in very low yields from its crops, a situation that Kazakhstan already experiences. Overuse of water reduces per hectare annual yields directly because the plants are stressed by so much water. It also reduces arable land because of the salinization of soil cause by the overuse of water combined with ineffective drainage. Overuse of water for agriculture also pollutes the water in rivers and other water bodies, including aquifers, by increasing salinity. Additional pollution is cause by insufficient treatment of municipal wastewater prior to disposal, unmanaged industrial waste dumping and unregulated solid waste disposal.

The above shows that the problem in Kazakhstan is not a resources problem but a management problem. And it is a problem which can be solved through applying the principles of IWRM.

It is well accepted that the management of the water resources of Kazakhstan is at a very low point. A decade of budget and staffing cuts has had a dramatic effect on the ability of the authorities manage water at all. This is immediately apparent simply by looking at the low number of people involved in water management and in the extremely low budgets the water management organisations are allocated by central government.

Currently in Kazakhstan water resources management is best described as being fragmented, underfunded and poorly governed. IWRM offers the best method of turning these around to being integrated, properly funded and well governed.

There are many consequences of a fragmented, sectorally driven, poorly funded, poorly governed water resources management system. A few to highlight in Kazakhstan are:

- The environmental disaster that is the Aral Sea, bad enough as an environmental and social disaster, but with the addition of the huge costs associated with attempts to stop or slow the damage and reduce the impact of the problem. Foreign aid support to alleviate the problem amounts to about $40 million over the 10 years to 2002, with significant additional funds from the Government of Kazakhstan on such projects as the dam separating the North Aral Sea from the rest.
- The concern over Lake Balkash and the potential for a disaster similar to that of the Aral Sea has not yet led to any concrete action to improve the situation, either in terms of stopping the pollution from the copper mining activities and agriculture or to manage Kapshagai Reservoir in an environmentally safe way.
- Continuing desertification of agricultural lands associated with overuse of water for irrigation, and the consequent drainage problems.
- Poor and deteriorating water quality in most water bodies in Kazakhstan.
- Apparent localised water shortages where the actual total resource is sufficient.
- Irrigation demands that are several times higher than in other regions of the world with similar crops and climates.
- The estimated cost of lost crop production, mainly through poor irrigation efficiency, is $1.7 billion annually across Central Asia with about $200 million annually in Kazakhstan. This does not take into account lost land and other damaged ecosystems.
- Vast amounts of money have been spent on large infrastructure which would be unnecessary if managing water demands were given the right attention, and there are further plans to build additional structures.

In short, it is evident that the existing approach to water resources management in Kazakhstan is not working. An integrated approach, in which the river basin is managed holistically, with the participation of water user stakeholders and ensuring environmental sustainability, would resolve many of the above problems.

1.4 The Opportunity for IWRM in Kazakhstan

Globally there is a well understood link between economic and social development and the effectiveness of water management. The approach and system of water resources management in Kazakhstan currently resembles that of Third World countries. The continued social and economic development of Kazakhstan depends on having access to good quality water. Financing improvements in water resources management is not a cost, it is an investment in the future.

Establishing IWRM in Kazakhstan is therefore a pressing issue. The longer it takes to improve water management the longer economic and social development will be retarded. This is also a good time to work toward instituting IWRM because of the current global initiative to implement it. There is considerable support offered through shared experiences among countries working toward IWRM and through projects

which assist in identifying and planning the way forward. Advantage should be taken of this opportunity.

Kazakhstan will be the first country in the region to have prepared a National IWRM and WE Plan, as directed by the Johannesburg Declaration. That puts Kazakhstan in a position to lead the region and support its neighbours in promoting and implementing IWRM.

1.5 What is the National IWRM and WE Plan?

The National Integrated Water Resources Management and Water Efficiency Plan will be followed by professional water managers and other specialists to implement real, functioning IWRM in Kazakhstan. With appropriate commitment and effort it is reasonable to estimate that it will take 10 to 20 years to properly implement IWRM in Kazakhstan. This Plan presents a vision for the period to 2025 but covers in detail only the next 5 years. The objective of the Plan is get the process of IWRM started, to define the steps which are most crucial, most immediate. Other, future steps and activities will become apparent as the move toward IWRM progresses.

The National IWRM & WE Plan is prepared by the CWR and is a document of the Government of Kazakhstan. It is a Plan for all of Kazakhstan, for all water users:

- for Kazakhstan's environment and those who look after it and care for it
- for the general public who reasonably and rightly expect to have clean, healthy water available to them
- for industries and agriculture which will continue drive Kazakhstan's economic growth

The National Plan defines what steps and actions are needed at the national level to support effective and integrated water resources management at the river basin level, where hands-on management is done. The Plan details what needs to be done with estimates of how much it may cost. This will not be a complete budget breakdown, but rather an indication of the level of financial commitment required from the Government of Kazakhstan. Without such a commitment implementation of the Plan will fail, which means a failure to live up to the commitment to the Johannesburg Directive. Further work on specific budget items will be needed by each department and ministry at such times as they are preparing budget applications for their next financial year.

The National Plan is about water governance. Its focus is on how to get management structures working better. It is about how to achieve integration. As had been stated earlier, the 2003 Water Code contains many elements which adhere to the principles of IWRM. The first and biggest step in improving water governance is to commit to implementing the Water Code. If implementing the Water Code is taken seriously by the Government, the details of putting IWRM into practice will follow.

Implementing IWRM does not mean throwing away all current practices and adopting new. In Kazakhstan, some of the most basic elements are in place. For example:

- the River Basin Organisations are in place, but need strengthening and capacity building;
- the Water Code defines specific elements of IWRM (though they are not described as such) now it needs to be implemented;

- there is a growing understanding in civil society that the water environment can be managed better, but this understanding needs to be better organised and mobilised.

Rather, implementing IWRM means adapting and improving existing practices, making major changes only where and when they are necessary.

1.6 Importance of the Time Scale of the National IWRM & WE Plan

The National IWRM & WE Plan presents a strategy for establishing and implementing IWRM and improving water use efficiency over 20 years. This requires a *vision* of the future in which water is managed properly and used rationally. In other words, it is not what we do and are able to do now that is important but rather what we want to do and wish to be able to do in the future.

The water use landscape will also change. For example, farms are likely to be larger, more industrial and more business oriented than today, which raises important questions, such as:

- Will farmers continue to have cheap water supplies and subsidised inputs 20 years from now?
- Will the farmers continue to be allowed to damage land resources through overuse of water 20 years from now?

Industries will make greater demands on water resources necessitating the improvement of water use efficiency within them. Choices also present themselves here, such as:

- Will industries be allowed to pollute rivers and other water bodies 20 years from now?
- Will there be new industrial legislation and policies which pave the way for improved water use efficiency and methods of disposing of waste?

Simultaneous economic and social development and the establishment of IWRM will mutually drive each other. As prosperity grows, driven mainly by the private sector, people will begin demanding improvements in their environment, including improved water quality, improved environmental conditions, etc. There is little doubt that the public's answer would favour change. The National IWRM & WE Plan provides directions on how to achieve IWRM and its objectives in Kazakhstan toward a future of clean, accessible water for all. In beginning now to implement IWRM Kazakhstan will be prepared for the coming social and economic changes by ensuring that there is sufficient clean water for all its needs.

1.7 Kazakhstan's Ongoing National and International Commitments

Kazakhstan has made a strong beginning to establishing IWRM through its commitments to several international protocols, conventions and agreements, as well as national initiatives leading to improved water resources management.

- Perhaps the most pertinent to the preparation of this National IWRM Strategy is the Johannesburg Directive, which calls for each country to prepare a National IWRM and Water Efficiency Plan by 2005. Kazakhstan, indeed the President

himself, signed this directive committing Kazakhstan to improving water resources management by adopting the principles and practices of IWRM.

- Further, the Prime Minister issued an Instruction on 13 October, 2004, to implement a Plan of Measures agreed in consultation with the Prime Minister of Norway. The Instruction consists of 11 Measures, the 10th of which is to "promote and activate bilateral cooperation for the purpose of implementation of the complex plan of the Republic of Kazakhstan on water resources management and implementation of the Johannesburg Directive." The Ministry of Agriculture is listed as the responsible agency. The UNDP Project for the Preparation of a National IWRM and Water Efficiency Plan for Kazakhstan, which is supporting the preparation of this document, is supported by the Norwegian Government and it is now the responsibility of the Government of Kazakhstan to complete, adopt and implement it.

- The Millennium Declaration of the United Nations (2000) expresses the common vision and agreement within the international community on plans of action to free the world of poverty and the misery associated with poverty. As with all UN member states Kazakhstan signed the Declaration and is committed to achieving the Millennium Development Goals (MDGs). It is widely accepted that to achieve the MDGs for water supply and sanitation effective water resources management is also necessary, leading to the conclusion that establishing IWRM is an integral component of achieving the MDGs.

- In 2003 Kazakhstan ratified its adoption of the Convention on the Protection and Use of Transboundary Watercourses and Lakes, known commonly as the Water Convention. Initially created in Helsinki in 1992, this is an important convention in that it details the responsibilities of all countries to ensure that the water they share with other countries is protected. Members of the United Nations Economic Council for Europe (UNECE) are obliged to follow it and it is intended that this will be extended to all UN member states.

- In 2001 Kazakhstan ratified its adoption of the Aarhus Convention which addresses the right of the public to access to information on environmental issues. Water information is included in this as water, environment and ecology are interlinked. This promotes the involvement of civil society in water and environmental management decision making.

- The statement of the President of the Republic of Kazakhstan known as Vision 2030 states that all people will have access to high quality water and protection of public health, and assures clean conditions and means of subsistence. These also aim at, and require, improving the management of the water resource.

- In 2003 the Kazakhstan Water Partnership was formed. Affiliated with the Global Water Partnership it aims to encourage and support cooperative efforts in water management and to develop a new ethical responsibility for water consumption in the society through education, dissemination of information and technical support.

- The National Committee for Sustainable Development has been formed to assess development from a more holistic point of view, which should include aspects that affect or are affected by water resources management. It should be noted here however, that the *CWR is not represented on the NCSD; a serious oversight which should be corrected*.

- The new Water Code (passed in 2003) forms the legal base for IWRM. Indeed, *establishing IWRM is essentially the same as implementing the Water Code*. Implementation of the Water Code has been slow for various reasons including conflicts with other laws and codes but it is expected that such discrepancies can and will be solved.

- The one element of the Water Code that is being implemented now is the establishment of River Basin Councils as the stakeholder representatives in water resources management. This needs to be fully supported by Central Government and local administrations.

- The Law on Environmental Protection (1997) contains components concerning water and covers issues of environmental protection including the water environment. It includes important components on the sharing of information, which sets a precedent for such sharing of water information.

- The Law on Environmental Protection is to be upgraded to an Environment Code in 2006. It is expected that the new Environment Code will include articles on the 'polluter pays principle' and other protection aspects. *It is essential that the Environment Code be coordinated with the Water Code*.

- The so-called "Law on Self-Governance" is the law which shifts responsibility from the national government to local (Oblast) administrations. However, it does not seem to also ensure that there is sufficient money to finance the Akimats' new activities. In addition, there are several significant conflicts between the Law on Self-Governance and the Water Code. In particular, the Water Code places all responsibility for "use and protection of water resources" in the hands of the River Basin Organisations (and the Committee for Water Resources) but the Law on Self-Governance now puts many of the activities with the Akimats. This conflict needs to be resolved. According to the principles of IWRM, all activities should stay with the RBOs as in the Water Code.

2 What is Integrated Water Resources Management?

2.1 Definition of IWRM

Integrated Water Resources Management (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[1] were first put forward. At the Rio Conference later in the same year, six basic principles of IWRM[2] were presented and they provide a good founding in what is meant by IWRM:

1. The river basin is the correct administrative unit for managing water.

2. Water resources and the land which forms the river basin area must be integrated, in other words, planned and managed together.

3. Social, economic and environmental factors must be integrated within water resources planning and management.

4. Surface water and groundwater and the ecosystems through which they flow must be integrated within water resources planning and management.

5. Public participation is necessary for effective water resources decision making.

6. Transparency and accountability in water management decision making are necessary features of sound water resources planning and management.

However, 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.

Implementing IWRM primarily means integrating government policies with each other, with the impact on water resources in mind. This means economic and social development policies, agricultural policies, industrial policies, health and social welfare policies, etc. A few examples pertinent to Kazakhstan are:

- integrating agricultural policies with environmental policies – it is essentially impossible to improve water quality in rivers or to restore and maintain wetlands and other water bodies in irrigated agricultural areas where drainage is not effectively dealt with and water is overused. The situation on the Syr Darya is a prime example of this.

- integrating agricultural policies with international, transboundary policies – demanding more water from upstream countries is difficult to support when so much water is wasted and polluted here in Kazakhstan.

- integrating agricultural policies with water management policies – there are many ways to reduce and rationalise water use in agriculture. All require good coordination between the irrigation service providers, agricultural extension and water resources managers.

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

- Integrating water management with environmental management to ensure water quality in rivers and lakes is actually managed – which it is not at present.

- Integrating surface water management and groundwater management to improve conjunctive use of surface and groundwater which could have a very beneficial effect on irrigation water use and access to domestic water.

- Integrating water use with water resource availability – while the need for this integration may be obvious it is not always followed in policy or operational management.

- integrating environment with industrial policies to reduce pollution – it makes little economic or environmental sense to allow industries to pollute water bodies, only to have to clean the water up again to use it for other purposes downstream.

- integrating environment and municipal water and waste management policies – as for industry above, it makes little sense to pollute here then clean up there; it is better and cheaper not to pollute in the first place.

- integrating poverty reduction policies with water policies – ensuring clean, safe and sufficient water supplies to all people is a prerequisite to economic and social development at every level.

- integrating the Water Code with the Environment Code – the 2003 Water Code lays the foundations for establishing IWRM in Kazakhstan. Now almost two years later, very little of the articles in the Code have been implemented. There will be a new Environment Code in 2006 which will profoundly affect water management. However, the water management organisations are not involved in the development of the new Environment Code.

Kazakhstan needs to implement the principles and practice of IWRM because of the severe environmental, economic and financial consequences that the current fragmented and underfunded approach to water management has had on the country. Such consequences will continue and worsen into the future if no action is taken.

Water resources management must improve and develop faster than the economy so as not to be a hindrance to its growth.

2.2 Definition of Water Efficiency

Water efficiency is simply a term to express the use of water in the least wasteful way; in other words, maximising water's potential. The GWP refers to two different aspects of water efficiency: *technical efficiency* and *allocative efficiency*.

Technical efficiency refers to the use of water in an area or sub-sector while minimising waste. Technically, this requires *demand management* interventions.

Example: Irrigated agriculture in Kazakhstan uses just over 70% of the total water consumption of 11,000 MCM annually (2002). Irrigation has an overall efficiency rating of about 25%. This implies that 75% is not used by the crop and is hence wasted. With the type of irrigation infrastructure in place in much of Kazakhstan's

irrigated areas the best efficiency rating that can be reasonably achieved is about 50%. A simple calculation shows the impact on the overall resource, however. With total consumption at 11,000 MCM and an increase in efficiency of 20% results in a water saving of 5700 MCM per year; 10 times that which could be saved in the domestic sector and more water that is currently used by all non-irrigation users of water combined.

This is not to argue that efforts to improve water use efficiency should not be undertaken in the domestic subsector, but is used only to show context when considering where to concentrate efforts. Contributions in water saving from all sub-sectors are important to the water resources of Kazakhstan.

Allocative efficiency refers mainly to economics, allocating water to the highest value water users. Naturally this assumes that environmental and social needs are met prior to restructuring allocations on the basis of economy.

Example: Using irrigated agriculture again as an example, 70% of the total water consumption in Kazakhstan generates less than 10% of the total economy. By comparison, industry generates about 30% and uses 24% of total water use. By saving the 5700 MCM described above through improvements in *technical* efficiency there would be significant improvements in allocative efficiency as well.

3 Key Objectives in Introducing IWRM in Kazakhstan

Establishing IWRM in Kazakhstan is a significant commitment in finances and in time and effort so there must be sound objectives to doing so. Following is a set of key objectives which provide the main impetus for committing to implementing the National IWRM and WE Plan.

3.1 Ensure the Continued Economic and Social Development of Kazakhstan

As economic and social development continues in Kazakhstan the distribution of water demands will change, for example:

- domestic water in both the urban and rural sub-sectors will increase as more people gain access to clean water in their households
- greater demands will be made on rivers and lakes for recreational purposes and people will demand cleaner water and cleaner environments
- environmental flows in rivers will finally be taken seriously, increasing environmental demands, because people will demand clean water in their rivers and lakes
- greater demands will likely be made in the industrial sector, including the commercial sub-sector
- irrigated agriculture will reduce its overall water use if effective efforts are put into improving water use efficiency and as farms become larger and less subsidised

Economic and social development means change. The demands associated with the changes need to be met or development will be retarded. To support the changes in the water use regime requires effective water management. Planning will be a key aspect of water management to allow good investment decisions. Good coordination and communication between various ministries and departments, as well as with the private sector and civil society will be crucial. Establishing IWRM in Kazakhstan, as outlined in this Plan should provide the necessary foundation to ensure effective water management through good Interministerial coordination.

3.2 Ensure Adequate Water Supplies for All

Looking to the future, an increase in the total available water resource is highly unlikely. In fact, all experts forecasting the impact of global warming and the ensuing climate change suggest that there will be less water available as the glaciers, which are now melting at a very high rate, stabilise or disappear.

The only possible way to counter the potentially reduced water resource is to better manage what resources are available. Certainly this requires improving water use efficiency, decreasing water pollution and using groundwater conjunctively with surface water at its optimum level.

Solidifying transboundary water agreements is also very important, not because agreements will result in more water coming across the borders, but in order to ensure water security. Water security means that the amount of water available will be known and therefore can be planned for. Water security and planning will also increase financial efficiency in the water sector by reducing the amount of money wasted on unnecessary infrastructure investments.

3.3 Ensure the Maintenance of a Good Environment and Healthy Ecology

The environment and ecology of water bodies has traditionally been given last place in decision making on water management. This is mainly due to a perceived conflict between maintaining a healthy water body and ensuring water supplies to users. The world is finally waking up to the fact that there is no conflict and that maintaining a healthy water body is to a large extent for the purpose of supplying water users.

In most cases treatment of polluted water to make it usable is more expensive than it is for the initial polluter to clean it up before disposal. Managing solid waste properly also reduces contamination of surface and groundwater but has further environmental and health benefits. Preserving wetlands by ensuring they receive sufficient, clean water supports the fishing industry, tourism, health and many environmental goals.

In Kazakhstan there is need to make a commitment to preserving the water ecology. This may be best addressed through establishing a code of practice similar to and based on the approach of the European Union Water Framework Directive (EUWFD). The most basic directive is to achieve 'good status' in all water bodies. The National IWRM Plan sets the target date for achieving good status in all water bodies at 2020.

3.4 Build the Foundation for Improving Water Use Efficiency

Very low efficiency of water use, especially in irrigation, is one of the biggest problems in Kazakhstan today. This is because there are huge and direct costs associated with the poor irrigation efficiency. It causes low crop yields, irreparable damage to agricultural land, saline groundwater which is no longer usable, environmental degradation of the rivers and other water bodies downstream as well as health problems among the local population.

Not all of the costs of the damage associated with poor irrigation practice have been calculated. However, the loss in crop yields alone is estimated at $200 million annually in Kazakhstan ($1.7 billion annually across Central Asia). Additionally, there is a proposal to build Koksarai Reservoir to capture winter releases from Toktogul in the Kyrgyz Republic to store it for summer use. Koksarai has an estimated capital cost of some $200 million, with a probable annual recurrent cost (for operations and maintenance) on the order of $5 million. Spending just this recurrent cost estimate on a committed programme of irrigation reform and farmer training to improve irrigation efficiency would almost certainly negate the need for Koksarai.

The government has already committed to improving water use efficiency by 20% by 2010. This is now only five years away and considerable work will need to be done to achieve it. Irrigation requires improved coordination and communication between agriculture and water, at the national level and at Oblast and river basin level. There are several methods which are available for improving water use efficiency, but all require the farmers themselves to be trained in order to change their irrigation methods and habits. Without training they will continue to irrigate the way they always have, negating any benefits from works designed to improve efficiency.

Most of the total volume of water savings will be derived from irrigation simply because the vast majority of water consumed is in that subsector. However, there are important savings to be mad in industry and in municipal domestic use. In industry

this requires opening dialogue between industry and water management authorities to investigate water saving technologies. It will also require a more stringent, transparent and systematic approach to monitoring industrial water use, including in the smaller industry and commercial subsectors.

3.5 Develop and Respond to Transboundary Agreements

Kazakhstan is both an upstream riparian, with several rivers shared with Russia, and a downstream riparian, sharing rivers with Russia, China, the Kyrgyz Republic and Uzbekistan.

As an upstream riparian Kazakhstan has a responsibility to ensure that the waters it passes on downstream are not damaged, which means not polluted and of sufficient quantity. Kazakhstan (as well as Russia) is a signatory to the Convention on the Protection and Use of Transboundary Watercourses and Lakes, commonly known as the Water Convention. The Water Convention specifies and details the responsibilities of each country to make sure the water crossing the border is of good quality. While there are agreements with Russia on water quantity which appear workable in the short term, Kazakhstan has yet to live up to the terms of the Water Convention because there is no management of water quality in Kazakhstan.

The fact that Russia also does not live up to the terms Convention is a poor argument for continuing this situation. Now, and in the future, Kazakhstan will wish to demand improvements in the quantity and quality of the water coming from its upstream neighbours. How can it justifiably do so if it is not living up to its own commitments with its downstream neighbours?

Kazakhstan is somewhat vulnerable as a downstream riparian. All of Kazakhstan's neighbours are developing economically, and according to their own interests, which will certainly mean a strain on their own water resources and a change to the reservoir release regimes of past times.

There have been difficulties in reaching agreements on cooperative water use within Central Asian and there have been greater difficulties implementing them. Partly this is a regional problem in which difficulties in water cooperation are part of the larger picture of an apparently low level of interest in international cooperation in general among the Central Asian countries, including trade, transport, energy, etc. But there are also barriers within Kazakhstan, particularly with its water management structure and its legal base, which make developing and implementing transboundary agreements difficult.

As the more vulnerable country, Kazakhstan must take the lead in developing and strengthening international cooperation on water and must first take the necessary steps to live up to its own international commitments. It also must organise its own water management structure to ensure there is proper authority for water management decisions to be made at the river basin level. There must be coordination between laws and a strengthening of the Water Code to ensure that international agreements can be implemented. Additionally and, perhaps, most importantly, the water management authorities, the CWR and the RBOs, need considerable capacity building before they will be able to implement working transboundary agreements.

There are very good economic drivers for developing strong and implementable transboundary agreements. For example, the cost of flooding on the Syr Darya due to winter releases of water from Kyrgyz reservoirs has been estimated at $770 million. This is calculated for both Uzbekistan and Kazakhstan, but with an assumption of half this amount for Kazakhstan alone, that is over $400 million annually. It is unlikely that the Kyrgyz Republic will revert to the old regime of summer releases, but there may be room for compromise, as there has already been in the annual agreements. More importantly, developing a long term cooperation agreement allows Kazakhstan to know what the winter regime will be like and plan investments in flood control more effectively.

This National IWRM and WE Plan outlines what needs to be done in order to support both developing and implementing transboundary water cooperation agreements.

3.6 Honour Commitments to International Conventions

As shown in Section 1.7 above, Kazakhstan has made commitments to several international protocols and conventions. The main barriers to implementing them are the weak water management structure and organisations and the limited coordination between ministries and departments with various responsibilities regarding water. Perhaps the biggest barrier is that there is not an organisation which has responsibility for managing water.

The government and president of Kazakhstan have also made commitments to the country which cannot be met without effective water management. One example is the commitment to increase water use efficiency by 20% by 2010. With less than five years to go, a coordinated programme between water management organisations, agriculture and research organisations has not been developed. This is a clear case where interministerial coordination, involvement of research and academic organisations and participation of the water users are necessary. Developing and strengthening these links is part of implementing the National IWRM and WE Plan.

It is apparent that the first priority for Kazakhstan in living up to its international and national commitments on water issues is the adoption and implementation of this National IWRM and WE Plan.

3.7 Achieve the MDGs

One international commitment which Kazakhstan must achieve is the UN Millennium Development Goals. Already Kazakhstan has achieved, or is near achieving, several of the goals or targets. However, the MDG which includes Water Supply and Sanitation and the environment (MDG 7) are not nearly met. Significant work is needed to achieve these targets. Effective water management is a necessary prerequisite for doing so.

3.8 The Presentation of the National IWRM and WE Plan

The Key Objectives listed above represent the larger goals to be achieved. The National IWRM and WE Plan itself is presented slightly differently, in the following sections, under headings aimed at specific actions that are needed to achieve them.

4 IWRM in Kazakhstan – The Overall Vision

4.1 A Long Term Process

The achievement of sustainable water resources management in Kazakhstan will be a long and difficult process because of the major governance changes required and the significant rebuilding of water management institutions that are needed. However, it is a necessary process without which economic and social development will be retarded and the clean water and environment and the access by all people to good quality water as called for in the President's Vision 2030, will be impossible. It is a step-wise process of implementing this National IWRM and WE Plan with the final goal described as achieving a 'good status' in all water bodies of Kazakhstan. The process is illustrated in Figure 4.1. All of the steps involved are discussed in detail in the various sections of this National IWRM and WE Plan.

The term "good status" simply means that the water body is healthy, clean and supports the ecology of the water body. It is borrowed from the European Union Water Framework Directive (EUWFD). While Kazakhstan has no legal or political obligation to adopt the EUWFD approach, it makes sense to do so as it is the most important development in water resources management legislation anywhere and is already the world standard and there is no reason for Kazakhstan to adopt less than the best.

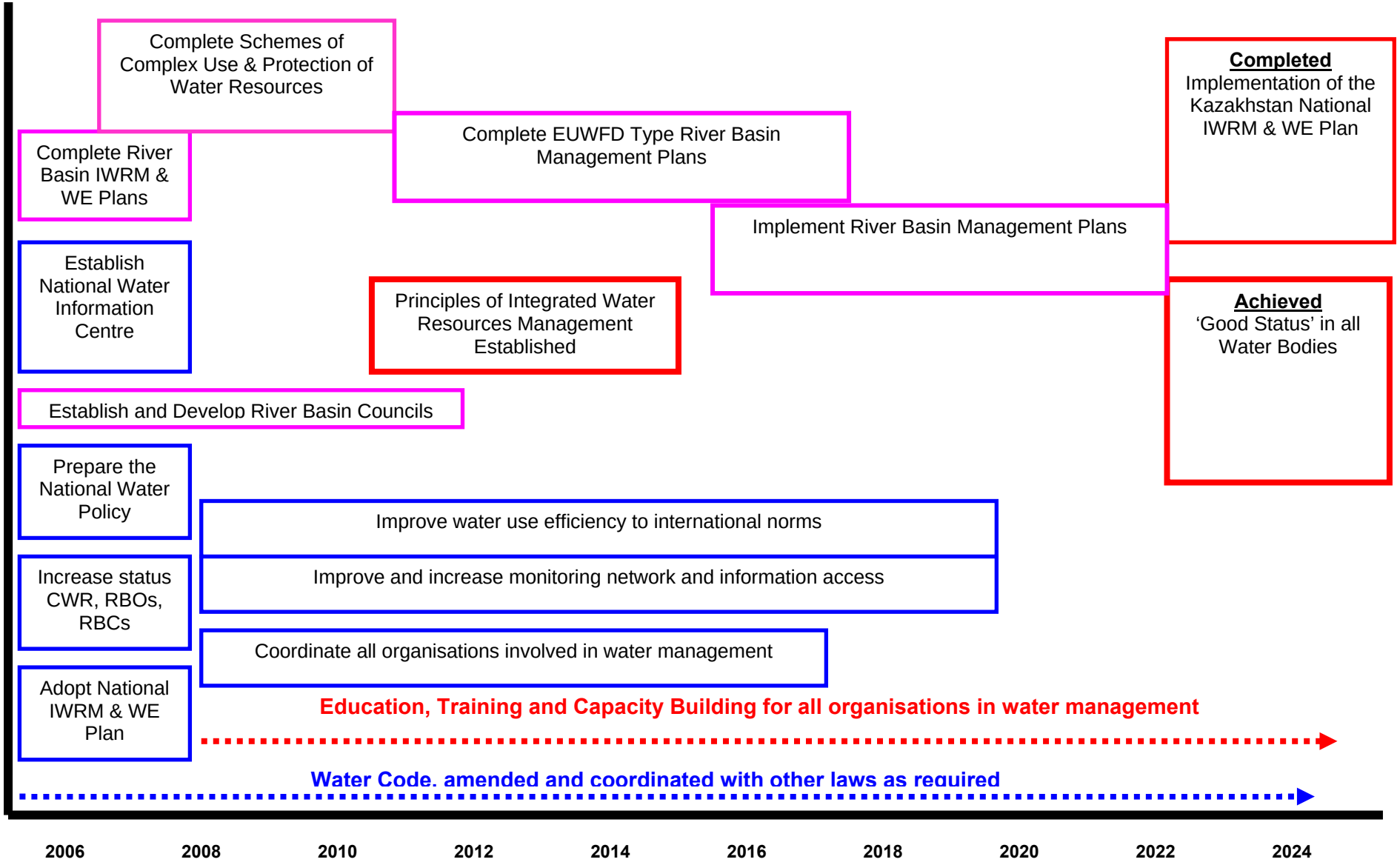
4.2 The Foundations of the Process

It is important to note in Figure 4.1 that the 2003 Water Code is illustrated as underpinning the whole of the process. The Water Code, with some necessary amendments and coordinated with other laws where there may be conflicts, must be the foundation of all future water resources management decisions. It is shown with an arrow pointing into the future beyond 2025. This is because laws must be as dynamic as they are fundamental, able to be amended when new conflicts are identified or when changes to the approach are necessary.

Figure 4.1 also shows that the process is also underpinned by education, training and capacity building. The education system in Kazakhstan has deteriorated since independence mainly through lack of funding, resulting in top academics and researchers leaving the university system or leaving the country. It has been difficult for those who have stayed to keep pace with the rapid developments in water resources management over the last 20 years. Water resources management education in Kazakhstan is now behind the rest of the world and needs to be brought forward.

Further education is also necessary to support the initiatives in developing and strengthening international cooperation on the transboundary rivers which are so vital to Kazakhstan. International laws and conventions related to transboundary water bodies have also been developing over the last 20 years and Kazakhstan needs to catch up in order to be competitive at the negotiating table.

Figure 4.1: Overall Vision from the National IWRM and WE Plan to 'Good Status' in all Water Bodies



Training is required at all levels to upgrade staff already involved in water management. Training is also crucial for improving the efficiency of water use, especially for irrigation. This means training farmers to irrigate correctly and conservatively. There can be no improvement on water efficiency, no matter what new technology or management tool is applied, if farmers continue to put the same amount of water on their land.

Capacity building is required in all ministries, departments and organisations involved in managing water or monitoring it.

In Figure 4.1, education, training and capacity building have also been illustrated with an arrow pointing into the future because knowledge is the key to effective management. The world is dynamic; so must be the management of water. Continuous learning and development is the only way forward.

4.3 The First Steps in the Process

Finalise and Adopt the National IWRM and WE Plan

The first step is the finalisation of the National IWRM and Water Efficiency Plan, submitting it to the government for approval and adoption and getting its implementation started as quickly as possible. Adoption should be completed and implementation begun by the middle of 2006.

Increase the Authority of the CWR and RBOs

This is a very important step as all other steps and the overall implementation of IWRM in Kazakhstan depends on it. The Interministerial Working Group already established should continue through 2006 to decide on the best option and present their recommendation to government for approval. This should be completed by the end of 2006.

Prepare and Adopt a National Water Policy

A Water Policy takes the Water Code a step further to an official government policy which is simple, clear and understandable by all. It is a statement of the government's commitment to proceed on improving water management.

Establish and Develop the River Basin Councils

The River Basin Councils are the representatives of the main stakeholders in water management – the water users. The RBCs are the key to effective and sustainable water management into the future. They are being formed now but need continued support and development for several years until they become self-sustaining.

Establish the National Water Information Centre

Good management cannot be done without good information. Good water information should be developed and housed with the CWR through an accessible portal with all organisations contributing and using it.

River Basin IWRM and WE Plans

Real implementation of IWRM and the achievement of good status in all water bodies will happen at the river basin level. Implementing IWRM needs good planning and this will start in 2006 with the beginning of the preparation of the River Basin IWRM and WE Plans.

All steps and interventions shown in Figure 4.1, including those briefly described above, are discussed in detail in the following sections.

5 Ensuring Active Government Support in IWRM

5.1 Complete and Adopt the National IWRM and WE Plan

This is the Draft phase of the National Plan. It needs to be completed as a final and presented to government for approval and adoption as an official government plan. This will be the first step in central government involvement in the Plan. From the perspective of government support, the most important part of IWRM is the *integration* of all ministries associated with water, either as users or through environment or as a health concern, etc. It is the Central Government, through the Cabinet of Ministers, that must ensure this integration. An Interministerial Working Group has been assembled and working with the preparation of the Plan. They should be the first point of contact for all ministries.

There is an international aspect to the National IWRM and WE Plan in that preparation of the Plans is a global initiative. Kazakhstan will be among the first to complete a Plan and adopt it. At the IVth Global Water Forum in Mexico in March 2006 those countries which have completed their Plans will be presenting them. This is a good opportunity for Kazakhstan to do the same, to show that it is among the leaders in taking the decision to improve water resources management, and provide assistance to countries which are further behind.

5.2 Prepare and Adopt a National Water Policy

Countries that have taken on the commitment to improve water resources management generally develop a National Water Policy. In Kazakhstan the Policy should be in line with the new Water Code and take the form of a commitment to implement the Water Code. A National Water Policy is a policy of the Government, not of a specific ministry or department, and ensures that the Government is committed to and involved in managing the water resource of Kazakhstan. The National Water Policy should define how it links with other national policies and goals. The CWR will need to drive the process of preparing a Policy, probably by drafting one and submitting it.

5.3 Ensure CWR Representation on the National CSD

There is an existing National Committee for Sustainable Development which is inter-ministerial in organisation and chaired by the vice Prime Minister. A significant oversight in its membership is that water management – the key to successful sustainable development – is not represented. The CWR must have a seat on this Committee.

5.4 Overcome the Underfunding of Water Resources Management

Managing water resources costs money. Most of the money must be derived through Central Government reserves because the management of the resource does not generate its own revenue. The first and most difficult task is to educate central government in the direct relationship between water resources management and the

economic and social development of the country. Once that is understood, investing in water management will follow.

A study on potential financing sources and how they may be addressed should be carried out. Other than through direct central government budgets the most likely source is through bulk water users such as irrigation, industry and municipalities. Payment for water by the water users serves the two purposes of supporting the water management and service delivery structure and as a disincentive for overuse of water. However, for it to be effective the money collected must stay with and be associated with the water management – not used as a means of central government generating revenues. This will require a change in current practice and likely in law.

5.5 Improve the Authority of the CWR and RBOs

The Chairman of CWR cannot speak on an equal footing with ministers, deputy ministers or even akims. The CWR itself, and through the RBOs, is the organisation that ensures the water users are using water correctly and sustainably. The only possible way to control water use and manage water effectively is to be able to dictate water policy. At government level the users are represented through other ministries and the need for CWR to have authority at least equal to other ministries on water matters is obvious.

The same situation applies at the river basin level. RBOs have no authority at all and therefore cannot effectively carry out their functions under the Water Code. The establishment of RBCs worsens the situation as the Chairman of the RBC, who is also the Director of the RBO, has a lower government status than oblast akims or even rayon akims.

6 Improving Governance for IWRM

6.1 Increase the Authority of CWR

The Committee for Water Resources, in itself and through its River Basin Organisations, is charged with managing all aspects of water resources. With the passing of the new Water Code in 2003, the number of functions that the CWR and the RBOs are assigned actually increased. Neither the CWR nor the RBOs have taken up any of the new functions and, indeed, are struggling to carry out the functions they had prior to the new Code. This is partly a result of underfunding and the resulting loss of staff and equipment, but it is also because of the very low administrative and government status of the CWR and the RBOs.

The chairman is not a Government member and so does not have the capacity to give instructions to other Government organizations. He has a status lower than a deputy minister which precludes direct communication with decision makers in other ministries who decide the all-important issues of financing and budget planning as well as coordination of activities needed to improve water resources management. This has a 'trickle-down effect' to the river basins where the RBOs and their directors share the low status of the CWR and its chairman. The low status of the RBO in turn affects the establishment of the River Basin Councils (RBCs). By law, the chairman of the RBC is also the director of the RBO but an RBO director has a lower government position than many of the representatives of local administration which need also to be on the RBC, notably Akims. This conflict is slowing the process of RBC establishment and will retard their development.

There is a transboundary issue here as well. Kazakhstan's dependence on transboundary water resources requires it to be in a strong position in international negotiations. Most of Kazakhstan's neighbours have maintained the former Soviet structure of a Ministry of Water Resources which Kazakhstan discarded after independence. Therefore Kazakhstan is represented at a lower government level than the other countries at the negotiating table leaving it with a serious disadvantage with respect to diplomatic protocol, as the chairman of the CWR must refer to his Minister of Agriculture and Minister of Foreign Affairs on all decisions.

The placement of the CWR within the Ministry of Agriculture adds to the low status of the CWR because its chairman can never achieve the status even of a deputy minister, let alone a real decision maker. An additional issue with the placement of the CWR within the Ministry of Agriculture is the conflict of interest present with the manager of water resources being under the direction of the largest user of water. Water management is also not the Ministry of Agriculture's main concern which results in water management receiving only limited support. If water management is to improve in Kazakhstan it needs full support of the government and not the secondary consideration it receives now.

The problem of low status at the international level, the national level and the river basin level, plus the problem of conflict of interest can easily be solved by moving the CWR out of the Ministry of Agriculture.

The recent ADB funded project, "Institutional Strengthening of the Committee for Water Resources" puts forward four options for the future of CWR, as follows:

Option 1: CWR remains under the Ministry of Agriculture

This is the existing situation and, as discussed above, not an option if Kazakhstan wishes to improve water management.

Option 2: Create a Ministry of Agriculture and Water Resources Management

This is a half-way measure which would allow the head of water management to be a 'First Deputy Minister for Water Resources Management' under the Minister of Agriculture, which is one step up the hierarchical ladder from today. It would require establishing an additional national body such as a "National Water Resources Commission", the members of which would need to be high level (ministers or deputies). The idea of such a commission has been met very negatively by most stakeholders in water management because they see it as just another level of bureaucracy. It also does not solve the conflict of interest problem described above. This is not a viable option if Kazakhstan wishes to improve water management significantly.

Option 3: Create a State Agency for Water Resources Management

A State Agency for Water Resources has the advantage of being super-ministerial – not being associated with any particular ministry. It would be under the Office of the Prime Minister and hence the Prime Minister would be its voice in government. The head of the Agency (replacing the chairman of CWR) would still not be a member of the Government, which could have disadvantages at transboundary negotiations but this could be solved by bestowing the proper decision making authority on the head of the Agency. It also has the advantage of precedent. The CWR used to be a State Agency, before being shunted around several times between the Ministry of Agriculture and the Ministry of Environmental Protection.

Option 4: Create a Ministry of Water Resources

A Ministry of Water Resources has several advantages, the biggest of which is that the head of the water resources management organisation is would be a minister. This would solve the status problem both nationally and internationally and, with the correct approach, at the basin level as well. It would also remove any conflict of interest in water resources management. However, some special status would have to be conferred on this ministry to allow the minister to rule on water use, water pollution and land management issues over other ministries. Setting up a new ministry may also take a long time to decide and complete and improving water management is becoming an immediate concern.

A choice will need to be made on the change of status of the CWR and which type of organisation it should become. The first step is to establish an Interministerial Working Group to assess the possibilities and recommend a choice to government. An Interministerial Working Group has already been set up under the UNDP project which supports the preparation of this National IWRM and WE Plan which can continue in this role through 2006. The decision on which of the above options to choose will then take a short time, hopefully less than one year. If the State Agency (Option 3) is selected it could be formed within six months after the decision or, if a Ministry for Water Resources is to be created, perhaps eighteen months following the decision.

6.2 Increase the Authority of RBOs and RBCs

Kazakhstan is in the enviable position of already having in place water resources management at the basin level in the RBOs. The continuing problem is that the RBOs are weak in terms of their government status within their basins, have a very limited capacity for carrying out the work assigned to them under the law and are very badly underfunded. In water resources management it is necessary to have one organisation which is responsible for all aspects of water management. The number one principle of IWRM is that water is managed at the basin level. Therefore it would be counterproductive and a backward step to choose any other organisation for full responsibility. Therefore the RBO must be made the authority in all aspects of water resources in its respective basin. For this to happen there must be an increase in their status as authorities coupled with significant capacity building and increases in financing.

The first step is to increase the status of RBOs. The section above recommends an Interministerial Working Group to select the best option for the future of CWR and the RBOs and RBCs must be considered in that selection process. It is essential that the director of each RBO (who is also chairman of the RBC) have a government status at least equal to an oblast akim. Otherwise, the chairmanship of the RBC and authority to make water resources management decisions will never be effective. There is need for the chairman to be able to make difficult judgements on water use that may affect development plans.

6.3 Finish the Establishment of RBCs and Ensure Support for Their Future

River Basin Councils (RBCs) now exist under the 2003 Water Code and are being established in all eight river basins by the middle of 2006. However, establishing them is only the beginning. They need strong and committed government support especially in their first few years as they determine their roles, responsibilities and authorities. A major aspect of their development is determining how to ensure all water users are represented as members of the Council. For example, rural domestic water users must be represented but it is difficult to organise a large number of people to select a representative of their water needs. International experience shows that with appropriate early support RBCs can become strong representatives of water user stakeholders and effective contributors to water resources management in their basins.

Support includes initial financing for consumables, meetings, etc. in the first few years, followed by support to a secretarial, administrative and technical staff. It may be the case that RBCs can become self-financing but only if the legal system allows them to collect, save and spend money according to their own needs. Currently such a system does not exist, or is not available to RBCs.

6.4 Overcome Fragmentation

Water resources management is important to practically all sectors of the economy and the society. As a result there are many ministries, departments, local administration bodies, which are involved in water in some way. The key to integrating water resources management is not that all functions must be housed within one organisation but rather to overcome the fragmentation that keeps the various organisations communicating, coordinating and cooperating. However, the

responsibility for the overall management of the water resource, including its use and *protection*, which means water quality and watershed protection, must be with one organisation. The responsible organisation must therefore be able to count on other organisations contributing through monitoring, assessment, licensing, etc. This, in turn, means that either the responsible organisation has the authority to order the others to do the work required and to coordinate the work, or the central government itself must be involved directly to order and coordinate the work. This has implications either in increasing the authority of the CWR and RBOs. The only viable choices are a State Agency for Water Resources or a Ministry for Water Resources and the specific way forward will depend on that choice (see Sections 5.5 and 6.1).

The key ministerial and agency organisations that have involvement in water are described briefly below. This is not an exhaustive list but highlights the complexity of water resources management within the larger public sector sphere.

Ministry of Agriculture

Ministry of Agriculture is involved directly in water resources management because the Committee for Water Resources are located there. By extension, through the CWR, the River Basin Organisations are also an arm of the Ministry of Agriculture. It also represents the largest water user in Kazakhstan – irrigation for agriculture.

Ministry of Energy and Mineral Resources

This Ministry, through the Committee for Geology and Sub-Soil Exploitation, is responsible for the management of groundwater. They are also responsible for monitoring groundwater, including its quality.

Ministry of Environmental Protection

The main function of the Ministry of Environmental Protection, with regard to water resources management, is monitoring. The national hydrometeorological institute, Kazhydromet, monitors both water quantity and quality. Through the Departments of Environmental Protection at Oblast level monitoring of wastewater discharges is carried out with the potential of prosecuting polluters. Additionally this ministry represents the water use needs of the ecology, including wetlands, deltas, rivers and lakes, etc. but there appears to be no specific organisation or Ministry responsible for actual management of the water environment.

Agency for Land Resources Management

The Agency for Land Resources Management is outside the ministry structure. Its connection with water resources management is through what is referred to as ‘watershed management’ in IWRM parlance, meaning simply protecting the watershed in order to protect the water resource and its quality. The Agency has oblast level departments who manage on a more local scale and a state enterprise RSE “GosNPTSzem” which carries out land monitoring on its behalf.

Ministry of Health

Ministry of Health monitors the situation on access to domestic water as well as water quality at immediate domestic sources of water and also at inlets to water treatment facilities for the more specific purpose of analysing water treatment needs. Most of the monitoring is done through its Departments of Sanitary and Epidemiological Services at the Oblast level. As such, the Ministry of Health both

represents water users and their needs as well as carries out important monitoring functions.

Ministry of Industry and Trade

Industry is a water user and a potential water polluter. As such the Ministry of Industry is an important partner is water resources management. There appears to be no office in this Ministry dealing with water issues and they carry out no water management activities, but many individual industries do self monitoring of water use. At present the information on industrial water use is of questionable quality and value, an issue which needs urgent attention. Enhanced partnership with the Ministry of Industry and Trade is needed to improve the situation with both water use and with pollution, especially as pollution laws become more strictly enforced and various methods of water saving are assessed.

Ministry of Emergency Planning

Ministry of Emergency Planning is involved with water through flooding, drought and protection of water bodies against both natural and anthropogenic pollution. They also deal with issues of the security and safety of hydraulic structures and other facilities related to water and which are crucial to water management.

Ministry of Economics and Budget Planning and Ministry of Finance

Both of these ministries are involved in ensuring that ministries and departments have sufficient money to carry out their assigned tasks. For many years now the budget cuts to water management has meant that staffing levels are now about 1/10th of what they were prior to independence. Now the water management organisations can no longer carry out even their rather limited tasks prior to the new Water Code in 2003, let alone the many new functions under the Water Code. The story is similar with the other ministries noted here with reference to water management activities.

Certainly a main problem is the lack of any direct access to Finance and Economy on the part of many of the organisations (such as the CWR). Arguments supporting the need for increased budgets are not heard by the decision makers. Arguably, all ministries have had to compete for limited funds over the last decade and more. However, with budget surpluses there is now scope for rationalising the financing of water resources management.

Ministry of Justice

The Ministry of Justice must continue to be a key partner in water resources management. Kazakhstan is currently undergoing major changes in practically all aspects of law. Water resources and their management affect and are affected by all sectors of the economy and the society and therefore are affected by practically all laws.

It is essential that new laws codes and amendments to existing ones are carefully screened to ensure that there are not conflicts with each other which may damage the spirit of one or all of the laws. Two areas of urgency are the upcoming Environment Code and the Law on Self-Governance. There must be staff within the CWR and within the CEP and others to ensure that the various laws coincide and coordinate rather than conflict.

Local Administration

Local administration, including oblast departments of many of the above ministries, and the official local administration (Akimats), play the most important role in day-to-day water resources management. It is the Oblast departments who carry out the work of monitoring, etc. and have direct contact with the RBOs. The Akimats are also representatives and decision makers in key water use areas such as irrigation and domestic water supply. The Akimat is also the decision maker on oblast development, which affects total water use in the basin and changes to land use in the watershed.

As River Basin Councils (RBCs) are established and developed it is local departments and Akimats which will have the greatest role in water resources management. The RBCs will be the focal point of their coordination.

An important first step in effective water resources management is to resolve the fragmentation problem by ensuring coordination and cooperation on water issues between these ministries and departments, at both national and local level. An Interministerial Working Group is recommended to make the selection for the best option for the future status of the CWR, RBOs and RBCs. The same Interministerial Working Group should also put forward a plan to decrease fragmentation. The Committee for Water Resources should also draft a Regulation on Decreasing Fragmentation in the Water resources Sector for the Water Code and submit it for approval as a new regulation. However, the increase in authority of the CWR and RBOs will be the most important single action in overcoming the fragmentation.

6.5 Coordinate the Legal Foundation

Overcoming fragmentation, as discussed above, is one component of improving governance. It requires the leadership of central government to achieve and an understanding of the integrated nature of water management.

It is also necessary to ensure that potential conflicts between laws are minimised and coordination between them maximised. Of urgent concern are the Law on Self-Governance and the Environment Code, both of which should be completed in 2006. Both of these should be explicitly coordinated with the Water Code to define where responsibilities lie which are a part of water management. It is likely that amendments to the Water Code itself will also be necessary. Other laws, such as the Law on Taxation, laws governing the behaviour of industries and others are also important. Consistency of legislation is necessary.

The Ministry of Justice is responsible to ensure consistency. However, Justice cannot be expected to have experts on water or environment, etc. Rather, the various committees (CWR, CEP, Committee for Geology, etc.) should have personnel supporting Justice in monitoring laws and recommending amendments where necessary. Justice must also assign a person to coordinate with these specific water and environmental management organisations.

6.6 Rationalise Public Sector Salaries

In general, government and public sector salaries are too low to attract competent specialists. Many of the best people have left the civil service for the private sector or

to emigrate. Public services are important to the economic and social growth of Kazakhstan and the most important resource in ensuring they are properly delivered is the public sector workforce. Salaries competitive with the private sector are the only way to rebuild and maintain a competent public sector. This is a matter of some urgency and, with the national budget currently in surplus, now would be an appropriate time to take this important step.

6.7 Rationalise Financing for Water Management

Managing water requires money. But it is not so much a cost as an investment. The investment saves money in the short term and the long term by reducing environmental damage, increasing crop yields, driving economic development and, most immediately, reducing financial waste on unnecessary infrastructure projects. Water management organisations cannot carry out their work without sufficient money to do so. Little is achieved in developing a new Water Code which assigns additional responsibilities to water management organisations and then choose not to finance the work which those responsibilities entail.

At present the existing water management organisations, including not just CWR and RBOs, but also departments of the ministries highlighted above, are so poorly funded that they cannot actually carry out their work. This National IWRM Plan recommends spending over the next few years in some detail. It is up to the Central Government to ensure that proper funding happens.

6.8 Rebuilding Capacity in the Water Management Institutions

Another key component in improving governance in water management is to ensure that the organisations charged with managing water have the capacity to do so. There are several ministries, departments and organisations charged with various aspects of managing or monitoring the water resources of Kazakhstan. All are constrained in their ability to carry out the functions assigned them. The main reason for this has been the lack of finances available to them since Kazakhstan's independence. All the government bodies have lost equipment, working space, vehicles, etc. but, most importantly, they have lost competent staff, in many cases their best staff, either to the private sector or through emigration. At the same time, the world has been undergoing rapid improvements in water management methods and approaches (including the development of IWRM) and the diminishing capacity in the water management organisations in Kazakhstan has left them unable to keep up.

Now that Kazakhstan has recovered from its economic recession and boasts the fastest growing economy in the region it is time to rebuild the capacity of the water management institutions.

The following sections of the National IWRM and WE Plan cover building capacity in the main water management organisations. There is a greater focus on the Committee for Water Resources (CWR), its River Basin Organisations (RBOs) and the River Basin Councils (RBCs), but capacity building in several other key organisations is also addressed.

6.9 Implementation and Financing

Implementation will be mainly financed through the republican budget with some contribution from local budgets. There is potential for some elements to be supported through grants and loans from international funding institutions.

The general approach to Improving governance for the period 2007-2010 is provided in Table 18.1 in Section 18 of this Plan. There are several unknowns in the approach as it requires such aspects as rationalising civil service salaries and increasing staff (for which salaries are not known). However, ignoring those aspects for the present, the estimate of cost for 2007-2010 is 55 million Tenge ($US 0.42 million). This does not include the operating and other annual costs of the organisations discussed here.

7 Rebuilding Capacity in the Committee for Water Resources

7.1 Increase the Authority of CWR

As discussed in Section 6.1 above, the CWR and, by extension the RBOs, need to be moved out of the Ministry of Agriculture if effective IWRM is to be established. The best option is for the CWR to become a State Agency for Water Resources. A second possible option is the creation of a Ministry of Water Resources. The Interministerial Working Group already in place assisting the project under which this IWRM Plan is being prepared can be extended to debate and decide on the best option by the end of 2006.

7.2 Increase Staffing in CWR

The immediate capacity building need of the CWR is a significant increase in staffing. In addition to the existing structure there are several new departments which are required, which are identified in Table 7.1 and described following. Note that the table identifies only new staffing requirements which are the minimum required to make a start on establishing IWRM.

Department for Implementation of the National IWRM and WE Plan

The most immediate concern is the preparation and implementation of the National IWRM and WE Plan. A specific department is recommended to oversee this task but several of the staff assigned to other departments will also be contributing to this most important task. The individual staff are described briefly below.

- department head - to oversee and take responsibility for implementing the National Plan, this person should be an overall water resources expert with training and experience in economics
- legal specialist – of relatively high status so that he/she can meet with people at Deputy Minister level and other high ranking civil servants. He/she is to take a legal role in implementing the 2003 Water Code, in ensuring the Environment Code to be completed in 2006 is in line with, does not contradict and coordinates with the Water Code.
- public administration specialist – to drive the coordination and linkage between local administration and water resources management
- environmental specialist – with knowledge of environmental and ecological water needs to coordinate with Ministry of Environment and drive the environmental component of the IWRM Plan.
- water quality specialist – with experience and training in water quality monitoring and assessment to drive the improvement of water quality
- agricultural specialist – with knowledge in agricultural water needs and water efficiency
- industry and domestic water use specialist – with knowledge of industrial water use and municipal / rural domestic water use.
- technical support staff - with varying experience from economics to environment to water users to monitoring to information technology.

A key task of this department is to monitor the progress of IWRM implementation and assess the needs for staffing, office space, equipment, consulting contracts, etc. for the following year for budgeting purposes. An annual progress report should be prepared highlighting the progress for the past year relative to targets and detailing successes and failures and the reasons behind them. An updated plan for the following year will also include new budget requirements.

Table 7.1: Immediate New Staff Requirements for CWR

Department / Area	Education / Expertise	No. of Staff	
Department for Implementation of National IWRM Plan	Department Head		1
	Legal Specialist		1
	Public Administration Specialist		1
	Environmental Specialist		1
	Water Quality Specialist		1
	Agricultural Specialist		1
	Industrial and Domestic Water Specialist		1
	Technical Support Staff		4
	Total IWRM Plan Dept.	11	
Planning Department	Water Resources Planner		2
	Economist / Financial Planner		1
	Technical Staff		2
	Total Planning Department	5	
National Water Information Centre	Department Head		1
	IT Specialist		1
	Technicians / Data Entry		6
	Total Information Centre	8	
Public Awareness Department	Department Head		1
	Programme Developers		2
	Technical Staff		2
	Total PA Dept.	5	
Dam Safety Department	Dam Safety Engineer		1
	Technical Staff		2
	Total Dam Safety Dept.	3	
Legal / Environmental Dept.	Legal Specialist		1
	Environmental / Ecologist		2
	Total Legal / Environment Dept	3	
Total Minimum New Staff CWR (2006)		35	

Planning Department

Water resources planning is a very specialised skill and necessary to avoid costly and wasteful mistakes in building unnecessary or inappropriate infrastructure. The department requires:

water resources planners – should be well trained in planning and in water resources modelling to lead the overall planning of the CWR
economist / financial planner – needs to be knowledgeable of government spending plans across all sectors in order to coordinate water resources management spending with the national budget
technical staff – with water resources or environment or economics backgrounds to assist in gathering and processing information

National Water Information Centre

The National Water Information Centre has been planned for two years already but has yet to receive any funding. Information is always the key to good management and the Information Centre must now be a priority. The National Water Information Centre is a national body which will collect and process data for specifically national concerns. It should also manage summarised data generated in the river basins which supports national analyses. Primary data collection and processing of river basin oriented information should be done at the river basin level within the RBO Information Departments (see Section 8.5).

The National Water Information Centre requires, as a first step:

department head – this person must have water resources management knowledge and some data management experience
information technology (IT) specialist – who will be responsible for the technical aspects of data base creation and management.
technicians / data entry – several technicians are required to gather primary data and carry out the basic analyses to turn the data into useable information. They should have water management training.

Public Awareness Department

There is already a public relations department within CWR and the public awareness department here should be amalgamated with it in some way. It is discussed separately to make the point that public awareness must become a more important part of CWR's work. It is well understood that an informed public helps to drive improvements to water and environmental management which supports the work of the CWR and other organisations in implementing IWRM in Kazakhstan.

As an initial step in creating a Public Awareness department the following staff are needed:

department head – this should be a person trained in public awareness or journalism and have connections with public information organisations and experience in public information including web site management
programme developers – should also have specific PA experience and writing skills and a good understanding of the issues in water and environmental management
technical staff – with skills in graphics, web design and other forms of information management and presentation

Dam Safety Department

The safety of dams and other hydraulic structures is a growing concern as the age of many structures approaches their design lives. Structures need to be assessed and monitored with recommendations on actions made annually. This requires at a minimum:

dam safety engineer – who takes responsibility for inspection, assessment and recommendations on interventions to ensure the safety of dams and other structures
technical staff – to support the engineer in inspection, data collection and data management, which should include asset management software

Legal / Environmental Department

The purpose of this department is initially to ensure that the Environment Code, to be completed in 2006, is linked with the Water Code and to determine areas where gaps need to be filled in the Environment Code and the Water Code to cover all the necessary aspects of water and environmental management as a part of IWRM. This requires:

legal specialist – who has experience both in the water sector and the environment sector and with contacts in the Ministry of Environment to work with those preparing the Environment Code
environmental / ecologists – to provide information on environmental and ecological matters and how they pertain to water resources and IWRM

The new staffing needs described here total 35 people, bringing the total staffing for CWR to about 70. This is just the immediate need - a first step in a long process of rebuilding the capacity of CWR. Staffing increases should begin early in 2006. Given the currently extremely low staffing levels in CWR, this may seem a large jump. However, comparing these staffing levels with those in countries in which water resources management actually works, this is still a tiny proportion. To implement effective water resources management in Kazakhstan, staffing levels will likely increase by a factor of about 10; in other words CWR will grow to several hundred staff. However, a growth factor of 10 merely brings water management staffing levels back to those of 15 years ago.

To implement IWRM properly and fully in Kazakhstan there will need to be major staffing increases in the CWR and the RBOs and other organisations. Staffing increases need to be carefully considered and made on the basis of an assessed need. The main function of the Department for Implementation of the National IWRM and WE Plan will be to prepare annual reports which will include requirements for new additional staffing and other budget requirements.

A Further Consideration on CWR Structure

A consensus is appearing within the international water management community that service provision should be separated from managing water resources. This would include, for example, separating water supply and sanitation functions from the water resources management organisations. At present, CWR does maintain a function of development of water supply and sanitation. Consideration should be given to whether this should continue or whether it may be more efficient to move this function into another organisation, such as the Oblast administration. At this time, the water supply and sanitation function of CWR is not a pressing issue but consideration should be given to making a change in the relatively near future.

7.3 Ensure Adequate Information for IWRM

In Section 7.2 above, development of the National Water Information Centre (NWIC) within the CWR is highlighted as an immediate need, especially as its creation is ordered within the 2003 Water Code. In the way of modern information systems, this does not mean that all data must be held in a single data base in a single location. On the contrary, it is far more efficient to link existing data bases and facilitate access to data by all interested parties. The NWIC will therefore become a link or connection between the ministries, departments and other organisations which will monitor, analyse and present information in data bases and access the information from other sources.

The most effective means of data base development is at the lowest practical level. In the case of water management, that lowest level is the river basin. The River Basin Organisation is therefore the right organisation to develop a primary data base for its own basin. However, other organisations within the basin (such as the Oblast office of Kazhydromet, Oblast Department of Environmental Protection, Sanitary and Epidemiological Services and others) will be developing their own information, with the RBO access it as necessary.

The key is for Central Government to ensure free access to all data by all parties. This is related to Section 6.4 above, on decreasing the current state of fragmentation in water management in Kazakhstan. As discussed in Section 1.7 above, in 2001 Kazakhstan ratified its adoption of the

Aarhus Convention which addresses the right of the public to access to information on environmental issues. This includes water as water, environment and ecology are interlinked. At present, government organisations do not have access to the information of other government organisations, let alone the public having access. There needs to be some immediate steps taken to rectify this situation.

Information systems need to be freely accessible, well designed, properly staffed and adequately funded.

7.4 Implementation and Financing

Implementation will be mainly financed through the republican budget with some contribution from local budgets, with some potential for support through grants and loans from international funding institutions.

The Plan for rebuilding the capacity of CWR for 2007-2010 is provided in Table 18.2 in Section 18. There are several unknown costs in the plan which will need to be determined at a later date, but the general cost estimate for 2007-2010 is 75 million Tenge ($US 0.58 million). This does not include the annual operating and other costs of the CWR.

8 Rebuilding Capacity in River Basin Organisations

8.1 Increase the Authority of RBOs

Capacity building in the RBOs is directed at strengthening them to make them fully functional water resources authorities in their river basins. River basins should be the basic unit of public administration for water resources and the RBOs need development in order to carry out those functions. Under the Water Code they are responsible for the 'use and protection of water resources'. At present they do not have the staff, skills or budgets to carry out those functions.

RBOs need to take responsibility for all aspects of the water resources, including protection of the watershed, protection of water bodies, improvement of water quality and the ecological health of water bodies and efficient use of water resources. This does not mean undertaking all of the work required. Other organisations and departments can continue their existing work (also with capacity building) but it must be done in coordination with the RBO. The RBO must be the authority in all aspects of water management in the river basin. This has direct relationship with Section 6.4 on decreasing fragmentation among the organisations related to water management. For the RBO to become the primary authority will require full coordination and cooperation between the organisations in the basin which will require Central Government to order the cooperation.

To carry out all the functions assigned under the Water Code, and to become functional authorities in water management, the RBOs need significant increases in staff and budget, as described in the following sections.

8.2 Increase Staffing and Budgets in the RBOs

Table 8.1 indicates the staffing needs for RBOs (for 2006-2007) specific to the expanded functions of RBOs to enable them to carry out their roles as full water resources management organisations. To begin with, each RBO needs an additional 27 technical staff for new functions for a total among all RBOs of 216 new technical staff.

RBOs also need to continue to carry out their functions as water user inspectors. Table 8.2 indicates the number of new inspectors required to properly carry out this role. The number varies with each river basin and is calculated depending on needs, which are mostly based on the number and type of individual water users in the basin. Total new inspection staff is 30 people, for a total immediate RBO staffing increase of 246 people. These staff are actually needed now, for 2006. It is accepted that it will be impossible to get them in place in early 2006 but every effort should be made to hire new staff within 2006 and into 2007.

While this may seem to be a large and rapid increase in staff it is warranted by its importance. Water resources support all sectors of the economy and poor management of the water resources damages the economy. Compared with expenditures and staffing levels from countries where water management actually works, Kazakhstan would need to have some 3000 staff in water resources, about 10 times the staff working now. Prior to Kazakhstan's independence there were approximately 3000 staff working in the RBOs and the equivalent of CWR. The staff requirements quantified here are the first step in returning to a functional level. Staff

increases must also continue into the future until such time as the CWR and RBOs can carry out their functions effectively.

There is anticipated growth in the number of water users over the next several years to 2010 as economic conditions change, with additional needs of 1 new inspector per year in the Nura, Ishim and Tobol-Torgai basins and 6 new inspectors per year in the Ural-Caspian Basin. No additional inspectors are needed in the immediate future for Chu-Talas and Aral-Syr Darya, bearing in mind the immediate need for 3 additional inspectors in Aral-Syr Darya.

Tables 8.3 through 8.5 indicate the new staffing for each of the proposed and existing departments of the RBOs and the skills required.

Following the preparation of this National IWRM and WE Plan each RBO will prepare River Basin IWRM and Water Efficiency Plans (see Section 8.4), which will be one of the first steps in the implementation of the National IWRM and WE Plan. Preparation will begin at the start of 2006, which means the additional staff are necessary right away. The River Basin IWRM and WE Plans will replace their current Annual Reports by 2007, further increasing the immediacy of the need for new staff.

The expanding functions and work load of RBOs will also require additional budgets for office space, furniture, computers, transportation, consumables, etc. as any organisation needs.

The proposed new staffing required for the RBOs is significant and may appear to be a large increase. However, if effective water management is to become a reality in Kazakhstan, this is a necessary first step. Similar to the discussion on staffing in Section 7 on the CWR, significantly increased staffing as described in the above tables is a necessary first step in rebuilding the River Basin Organisations. Further staffing and budget requirements have not been outlined in this Plan because further staff increases need to be assessed by each RBO on the basis of need. However, the RBOs need to have the ability to make and submit their own budgets. It is the responsibility of the Central Government to ensure these budget needs are met.

Table 8.1: Staff to Support Expanding Functions of the River Basin Organisations (all RBOs) 2006

Department	Staff Type			
	Professional	Technical	Administrative	Total
Department of Planning	2	2	2	6
Department of Conservation of Water Resources	7	4	0	11
Department of Comprehensive Water Use	N/A	N/A	N/A	N/A
Department of Monitoring, Information and Liaison	5	4	0	9
Other Departments	1	N/A	0	1
Total New Staff Required for Expanded Functions				27
Total New Staff Required for Expanded Functions				**27**

Table 8.2: Staff to Support Water Use Permit Inspections (all RBOs)

Details of Inspection Process	Nura Sarysu	Ishim	Tobol-Torgai	Ural-Caspian	Aral-Syr Darya	Chu-Talas	Irtysh	Balkash Alakol
Inspections:								
Current number of inspections per year	196	450	477	600	1799	230	408	300
Days required per inspection (average)	4	4	3	3	2	4	4	8
Number of inspectors required for inspection only	**4**	**8**	**7**	**8**	**16**	**4**	**7**	**11**
Issuing New Permits:								
Number of new permits issued per year	180	200	126	505	505	50	162	460
Days per required for issue of a new permit	4	4	10	4	1	5	2	15
Number of inspectors required for issuing new permits	**3**	**4**	**6**	**9**	**2**	**1**	**1**	**31**
Required Number of Inspectors for inspection and issuing new permits	**7**	**12**	**12**	**17**	**19**	**5**	**9**	42
Current Number of Inspectors	11	17	12	5	16	7	17	27
Total New Staff Required (Sum Table 8.2 and 8.3)	**27**	**27**	**27**	**39**	**30**	**27**	**27**	42

Table 8.3: Department of Planning: Staff Requirements for Expanded RBO Functions

Function	Staff Required	
Development and Operation of Decision Support System	2	modellers, university educated and with GIS and Water Resources Experience
Development of Schemes of Comprehensive Water Use	2	additional administrative for production of Schemes and other duties
Support to both of the above	2	technicians with at least secondary school and good computer skills
Total for Department of Planning	**6**	

Table 8.4: Department of Monitoring, Information, Cadastre and Liaison: Staff Requirements for Expanded RBO Functions

Function	Staff Required	
Water Quality Laboratory:		
Laboratory Head	1	experienced water quality laboratory manager
Lab-based Water Quality Analysts	2	analysts with university level technical training in water quality analysis
Field-based Water Quality Technicians	2	technicians with technical college education to receive training in water quality
Water Information System:		
MIS Specialist	1	university educated MIS specialist with knowledge of water resources issues
Technicians	2	technical or university education in water resources with good computer skills
Liaison & Public Awareness		
Group Head	1	person with PA experience with knowledge of media industries
Total for Department of M, I, C, L	**9**	

Table 8.5: Department of Conservation of Water Resources: Staff Requirements for Expanded RBO Functions

Function	Staff Required	
Supervision of Use of Water Resources	1	department head, university educated in water resources/ecology
Enforcement of Permit Conditions	2	technical legal specialists
River Basin Management Planning	1	university educated specialist in watershed management
River Basin Protection	2	technicians with technical education in data collection and analysis
Improvement of Water Quality &	1	water quality specialist
Areas of Special Interest and Protection	1	1 university educated ecologist / biologist
	2	technical or university education - mainly for field offices
Review of designs and control of operations	1	civil engineer in water resources with operational experience
Total for Department of Conservation	**11**	
Plus Additional IT person for WIS, network, etc.	**1**	IT specialist with data base knowledge
Total Staff per River Basin Organisation	**27**	

8.3 Rationalise and Improve Planning in the RBOs

Planning is perhaps the most important function in water resources management as it highlights where and when problems may be encountered in supplying water or in protecting the ecology of a water body and allow forward thinking to ensure the problems are solved before they happen. This should be and must become a primary function of the RBOs. Through several foreign funded projects significant effort has been put into building RBO capacity in planning. So far, these projects have had little effect because no new staff have been allocated to continue the work. With the staff increases shown above, RBOs can make a beginning at improving their planning ability and capacity building projects will begin to have an effect.

A key aspect of planning is the preparation of planning reports. These form a focus around which planning can be done and serve to highlight areas where problems may arise in the planning process itself.

At present each of the RBOs prepares an Annual Report at the end of March each year. The quality of the Annual Reports varies among the RBOs but in general they are not planning documents in the sense of presenting particular goals and monitoring progress toward the achievement of those goals. This is extremely important in water resource management and such planning reporting must start to be undertaken in the RBOs.

Because of the currently low capacity of the RBOs it is best to develop and evolve the planning process and the planning reporting over the next several years. The steps in the process are described below.

Step 1. River Basin IWRM and Water Efficiency Plans (2006 to 2007)

The River Basin IWRM and Water Efficiency Plans are similar to and follow the National Plan. They must follow (rather then precede) the National Plan because there are many interventions and changes in policy or law which need to be agreed, approved and ordered by Central Government before certain actions can be taken at the river basin level.

Similar to the National Plan, the River Basin IWRM and Water Efficiency Plans are oriented to institutional and organisational aspects, including capacity building and budgeting, rather than infrastructure or operational needs. They lay the foundation on which more detailed plans will be based.

Preparation of the eight River Basin IWRM and Water Efficiency Plans will begin in January 2006, immediately following the completion of the National Plan. They will be completed by March of 2007, replacing at that time the Annual Reports which are currently prepared by each RBO.

Step 2. Schemes for Comprehensive Use & Protection of Water Resources (2005 to 2010)

The Schemes for Comprehensive Use and Protection of Water Resources are detailed basin plans covering essentially every aspect needed to ensure that the resources are available to meet the needs of the water users into the future. In that respect they are much like what are often called Master Plans. The Schemes look at how rational use and protection of water bodies will be achieved as well as how to prevent the deleterious effects of water (for example flooding). They are mainly oriented to technical solutions for: ensuring availability of water and ensuring water is of good quality, the water balance of the basin, infrastructure requirements, etc.

They have aspects of the institutional, organizational and legal issues, but these are mainly restricted to recommendations rather than a defined series of steps to improve them. The River Basin IWRM and WE Plans reinforce the Schemes in that they directly address the institutional,

organizational and legal. In many cases the Basin IWRM & WE Plans will be completed before the Schemes, in which case the Schemes can easily absorb and add to the IWRM Plans. The CWR plans to prepare a General Scheme in 2006 to support and guide Schemes being prepared in the river basins.

The Schemes were an anticipated part of the work of RBOs from their inception, but only one was actually completed, and that was in 1989. In 2005 the Scheme for the Irtysh River Basin was completed as the first of the newer approach to them. Work to prepare Schemes in two other river basins will begin in 2005 and will be followed in other basins 2006 and beyond until Schemes for all river basins are complete, anticipated by 2010.

Step 3. Adapting the EU Water Framework Directive to Kazakhstan (2010 to 2015)

The European Union (EU) Water Framework Directive (WFD) is perhaps the most important development in water resources management legislation anywhere. While legally it is confined to the EU states, the WFD approach is already becoming the World standard. It is likely that Russia, for example, will adopt it sooner rather than later.

Adapting the WFD and applying it to Kazakhstan will require some time because it will be necessary to first build capacity within the water resources management organisations and establish at least the basic IWRM principles. This will be done through the first three steps outlined above.

The WFD is also relatively new, coming into force in December 2000, with a plan for action developed in 2001. It aims to prepare first draft River Basin Management Plans (RBMPs) in all EU member countries by 2006, and full scale RBMPs by 2009. These dates coincide well with those planned in Kazakhstan for the National and River Basin IWRM and WE Plans and the completion of Schemes in all basins. Taking the Schemes to something more in line with a RBMP as defined by the WFD, is a good progression for water resources management in Kazakhstan.

The fundamental point of the WFD is that water and the environment or ecology are seen as one and the same in terms of their management. A river basin is seen as an ‘ecological unit’. The overriding objective of the WFD is to achieve "good surface water status" and "good groundwater status", and also to prevent deterioration in the quality of those waters which are already "good". A major improvement in the WFD over earlier legislation and approaches is that ecological quality becomes the key means by which water bodies will be assessed, moving away from the more traditional assessment of chemical quality.

<u>River Basin Management Plans</u>

In Europe, the River Basin Authority (essentially the same in principle as a RBO in Kazakhstan) is responsible for producing a River Basin Management Plan (RBMP) for the basin. This is the main mechanism to outline how the authority will achieve the European Union Water Framework Directive water management and environmental objectives. The main elements (but not the only elements) of the RBMP are to define:

- Characteristics of the river basin
- Environmental monitoring data
- Details of the impacts of human activity (e.g. abstractions, pollution, etc.)
- Analysis of the economic usage of water
- Strategic plan for achievement of sustainable water use
- Strategic plan for the achievement of “good water quality status.”

It is important to note that in the all RBMP components, improving institutional and organisational aspects are a key part. That said, it can be seen that the RBMP is not greatly different from the combined Schemes and River Basin IWRM and WE Plans proposed for Kazakhstan – simply

more technically detailed and with a differing approach to water quality and good ecology that Kazakhstan has at present. It is more a matter of expanding the technical approach to river basin management planning once the technical, financial and organisational aspects of water management have been improved.

This last of the four steps leads to the overall goal of the achievement of 'Good Status' in all rivers and other water bodies by 2025. This achievement is illustrated in the earlier Figure 4.1 showing the overall vision of water resources management. Improving monitoring and information, as well as education, training and capacity building are also shown in Figure 4.1 as the foundation of achieving 'good status'. Without these in place establishing IWRM in Kazakhstan will be impossible. Good management requires good information and qualified, well trained and educated people.

8.4 Institute Management of Water Quality and Ecology in RBOs

The one issue in water management in Kazakhstan that is always referred to is the poor water quality. All rivers and lakes of any significance are badly polluted. Over the last decade and more all organisations that were involved in protecting water resources have been reduced to mere skeletons of their former stature. In fact, there is now no organisation in Kazakhstan which has the specific and clearly defined mandate to be responsible for managing and improving water quality in the rivers and other water bodies of Kazakhstan.

At the same time the monitoring of water quality and the health of rivers has been significantly reduced in the main organisations, Kazhydromet and the Department for Environmental Protection. River Basin Organisations, who also had their own water quality laboratories prior to independence, now have none and no staff with water quality training.

In summary the situation on water quality is this:

- no one is looking after water quality because no one has the responsibility to do so
- there is only limited information on which to base decisions on improving and managing water quality

The current water quality monitoring activities are as follows:

- Kazhydromet – ambient water quality monitoring in rivers and other water bodies
- Departments of Environmental Protection – monitoring quality of industrial discharges
- Departments of Sanitary and Epidemiological Services – monitoring of water quality at intakes to water treatment plants
- Departments of Geology – groundwater quality

All of these activities are valuable and should continue. However, the information gathered through them could contribute better to actually managing and improving water quality in the river basin. Most of the information obtained through these activities is kept with the monitoring organisation. The Departments of Sanitary and Epidemiological Services actually use their information for assessing water quality available for drinking and for correlating with health issues. Other than that, however, most data is stored, unused by the monitoring organisation. It is not used as a basis for planning improvements to the health of the river. This must change.

Specify the Responsibility for Water Quality Management in the RBOs

No organisation currently undertakes any activities to manage water quality toward an improved ecology in the river or basin. It is necessary to have one organisation responsible for water quality management in each basin. As no organisation does it now, capacity building, staffing, increased

budgets, etc. are required for any organisation selected to undertake this function. The RBO is a good choice for several reasons:

- the RBOs are the only river basin centred organisations
- the RBOs have already been made responsible for 'protection' of water resources under the Water Code
- the RBOs have as much capacity as any other organisation to take on this function
- this is the correct approach under the principles of IWRM

Under the 2003 Water Code the RBO have the responsibility for "use and protection of water resources". This implies many elements of IWRM, including protecting the water quality (and its improvement and management) as well as watershed protection which contributes to water quality management. However, the function and responsibility for water quality management is vaguely worded in the Water Code. A decision needs to be made that the RBOs are indeed responsible for water quality management, and all that entails, and specified explicitly through an amendment to or a new regulation of, the Water Code. It is also necessary to specify the water quality management function and responsibility as an article in the soon-to-be-completed Environment Code.

Re-establish Water Quality Laboratories in RBOs

To carry out the function of managing and improving water quality the RBOs will need to have independent laboratories for water quality analysis. This is not to replace or supersede the water quality labs at Kazhydromet or Departments of Environmental Protection or Sanitary and Epidemiological Services, but rather to enhance total available information.

Monitoring for effective water quality management takes three forms:

1. Ambient monitoring

Ambient monitoring is characterised by sampling at selected sites on a regular basis for a minimum of parameters to monitor the background or ambient water quality. In some cases this can be as few as three parameters depending on the known water quality and river basin activities.

2. Surveillance monitoring

Surveillance monitoring is carried out in addition to ambient monitoring when specific problems are identified or suspected. This can be done at any location on an ad hoc basis depending on the suspected problem or the type of water quality concern. Surveillance monitoring is typically used when anomalies are identified through ambient monitoring.

3. Forensic monitoring

Forensic monitoring is employed to determine sources of pollution or other water quality events, usually in conjunction with ambient and surveillance monitoring. Field testing laboratory kits are very useful in forensic monitoring because of their easy portability, but should be backed up by laboratory analysis where prosecutions may be involved.

Currently only ambient monitoring is done in Kazakhstan and, as noted previously, most of that information is not used to make management decisions. The RBO needs to have some independence of movement in order to be fully aware of all aspects of water quality in the basin. The RBO would mainly take on the role of surveillance monitoring and work with Departments of Environmental Protection on forensic monitoring. This requires re-establishing laboratories in

each RBO office, which my include branch or field offices distant from Oblast cities where the head offices tend to be located.

Prepare a Water Quality Laboratory Redevelopment Feasibility Study

In preparation for re-establishing water quality labs in RBOs a feasibility study should be commissioned to assess what is needed, what the alternatives are, the costs and benefits, etc. Consideration should also be given in the Water Quality Laboratory Redevelopment Feasibility Study to using the private sector to develop water quality labs.

Develop a River Basin Strategy for the Improvement of Water Quality

Once the RBO function of water quality management is established each one should begin to prepare a Strategy for the Improvement of Water Quality for its respective river basin. An initial WQ Strategy could be done fairly early, possibly even within the frame of the River Basin IWRM Plans. These could be grown and developed annually and eventually be included in the Schemes for Comprehensive Use and Protection of Water Resources and, further, in the River Basin Management Plans.

Water quality management is also a good focal point to bring together and catalyse cooperation and coordination between several of the most important organisations in water resources management – Kazhydromet, the Committee for Environmental Protection (CEP) and its Oblast Departments of Environmental Protection (DEPs) and the Committee for Water Resources and its eight River Basin Organisations. Additionally it opens the door for working with other water stakeholders such as environmental NGOs, research institutes and many more.

It will require a well coordinated and concerted effort on the part of all these organisations to succeed at improving water quality in a reasonable time. Forging such links and building cooperation is one of the main principles of IWRM and the purpose of the National IWRM and WE Plan.

8.5 Strengthen the Information Capability in RBOs

The importance of the development of an information capability in each RBO cannot be over stressed. Management simply cannot take place without good information. The RBOs themselves, from their directors to their inspectors are all aware of the lack of information and the lack of any access to information that hinders their work. The need for an Information Department in each RBO has already been discussed above, and some RBOs have actually instituted this already. The Information Department in each RBO also is intimately connected with the National Water Information Centre introduced in Section 7.2.

All water data should be collected and assessed and information developed at the river basin level. Not all data is collected or assessed by the RBOs as other organisations (also discussed above) collect and analyse water related data. However, with regard to water management issues – including surface water quantity and quality, groundwater quantity and quality, industrial and municipal discharge quantity and quality, land use, water use, etc. should be housed on a water information base managed by the RBO.

RBO staff have been receiving training on data base management under the UNDP Project for the preparation of this IWRM Plan and will continue to do so for the remainder of the project. However, a larger effort is required to have a fully functional information department within each one.

There are opportunities for foreign funded capacity building projects for RBO information capacities which should be taken advantage of. CWR should request such support.

8.6 Implementation and Financing

Implementation will be mainly financed through the republican budget with some contribution from local budgets. There is potential for significant proportions of the more expensive works to be supported through grants and loans from international funding institutions.

The Plan for rebuilding capacity in the RBOs for 2007-2010 is provided in Table 18.3 in Section 18. The total cost estimate 2007-2010 is 6757 million Tenge ($US 50 million). This does not include the annual operating and other costs of the RBOs.

9 Establishing and Developing River Basin Councils

9.1 The Need for River Basin Councils

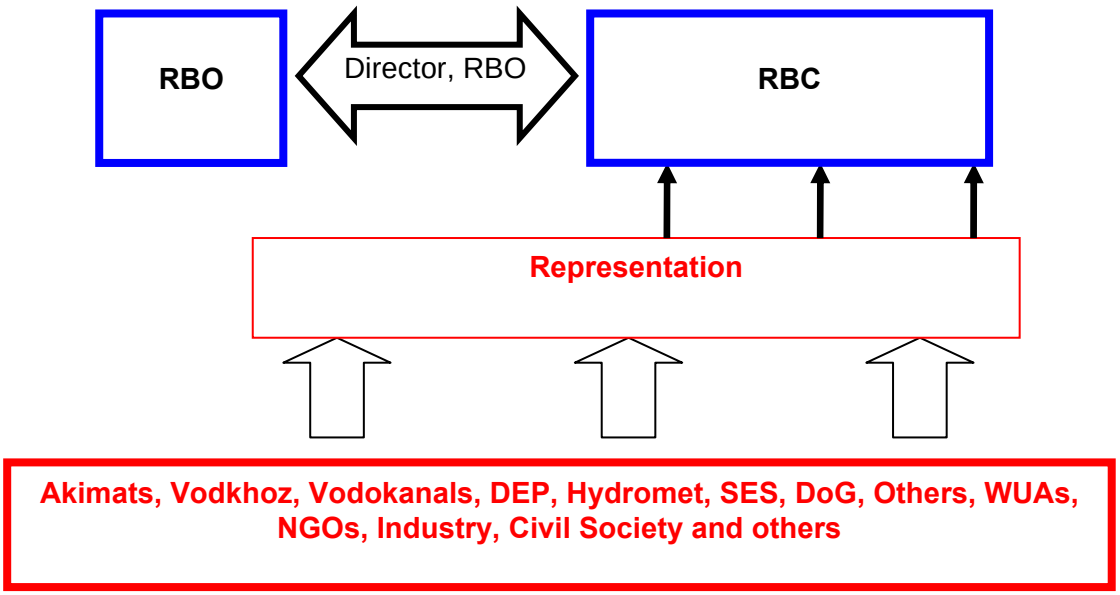
The last two of the six principles of IWRM (those of public participation and transparency and accountability) are related to stakeholder involvement. These are aspects of integration, specifically, integrating government administration with water user stakeholders.

International experience has shown that it is necessary for the water management organisation (the RBO in Kazakhstan's case) to be well coordinated with the main administrative structure and other organisations which use or affect water in some way. In Kazakhstan these include the Akimats of the Oblast and Rayon administrative divisions, the Oblast level departments of the various ministries either involved in managing water and the environment and representatives of industry and individual water users.

The RBO must understand the needs of all water users in order to respond to them and manage their needs effectively. Additionally, the users themselves need to understand each others' needs and interests and how they may coincide or conflict with their own. Prior to the establishment of RBCs no forum has existed in Kazakhstan to facilitate this important stakeholder aspect of water management. The RBC provides the forum to facilitate interaction among water users and with the managing organisation.

Recognising the need for administrative, public and water user participation in water resources management decision making, the Government of Kazakhstan introduced the establishment of River Basin Councils (RBCs) in the 2003 Water Code. Figure 9.1 provides a simplified view of how the water users and other interested parties may be represented.

Figure 9.1: Representation of Water Users in Management Decision Making



The River Basin Organisation (RBO) is the government water authority charged with the responsibility of operational water management. They are the technical, hands-on aspect of managing the water resource. Water users provide information and advice to the RBO on their needs and interests through the RBC. The RBC and the RBO are more intricately connected through the fact that the Director of the RBO also acts as Chairman of the RBC. It is a simple and workable system that should improve the way water is managed at the basin level.

However, to be effective the RBC needs good support and encouragement in its early years. Once it is firmly established and develops its own confidence, it will become an indispensable tool 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. However, answering these questions must not slow the process of establishing the RBCs. The RBC is an evolutionary organisation. Rather than being constrained by a strict set of rules on their make up, meeting schedules, chairmanship, etc. they need to be flexible and be able to respond to the differing and changing needs of the river basin.

Experience shows that the RBC will change significantly in its early years after establishment as its members come to realise the value of their roles. They begin to identify gaps in the RBC's membership and look for new members to fill those gaps. Over a period of five to ten years RBCs will change and evolve into stakeholder organisations which are right for the river basin it represents. This means that the eight RBCs of Kazakhstan will share the same purpose and overall operational policy but their membership and method of working will differ, reflecting differences in the needs and resources of the river basin.

9.2 Establish all Eight RBCs

Two of the RBCs were officially established during 2005: Balkash-Alakol and Nura-Sarysu. Their establishment was supported by the UNDP project which assisted the preparation of this National IWRM and WE Plan. The remaining six RBCs will be established by the end of 2006 with the continued support of the project as well as the RBOs and the stakeholders themselves. Establishment of the RBCs requires strong support of the RBOs, which have the responsibility to ensure their establishment under the Water Code, and the CWR as the national guide and monitor.

9.3 Support and Finance Development and Operations of all Eight RBCs

The establishment of RBCs is only the beginning. It will take several years for the RBCs to become confident and effective advisory bodies on water management. The most important period of the life of the RBC is the first few years after establishment. RBCs will develop at different rates depending on the people who become its first members, the strength of commitment by the RBO and the strength of commitment by the organisations or individuals the RBC represents. It is crucial to ensure that the RBCs are well supported during this critical period, perhaps five to ten years. Financial support may be put through central budget or through local administration, but either way, finances for this period need to be ensured.

9.4 Reassess and Amend Legal Base as Necessary

RBCs are insupportable without the rule of law. They need their own legal definition and a set of well defined rules. The Water Code itself establishes the RBCs, their relationship to RBOs and the chairmanship. It does not specify all members and this is a very good thing. Membership should depend on the needs of the Council itself and it will develop into the correct framework after a few years.

There are some weak points in the legal base. The biggest issue is the need for a regulation on the functions and competencies of RBCs. The regulation has been drafted but has not yet been approved and adopted into law. There are some conflicts with other laws – notably the “Law on Self Governance” which need to be sorted out. Legal conflicts were also noted in Section 6.5 with the recommendation for the Ministry of Justice as well as the CWR need to have legal people assessing the laws to ensure they can work together and do not conflict (which some do now).

As the RBCs progress and develop there are likely to be other areas where amendments are deemed necessary or where conflict between laws arrive.

9.5 Determine how to Ensure Stakeholder Participation

One key element of the establishment and development of the RBCs is the difficulty in ensuring that the needs of the individual water users reach representation on the RBC. It is a logistical problem in a country with little history of non-government organisations (such as WUAs) and no culture of such organisations. However, it is extremely necessary for everyone – rural domestic users, irrigation users, urban dwellers, people interested in recreation and others – should be represented. Like other aspects of RBC development, this will develop in time. But to assist and speed up its development pilot projects and other forms of assessment are needed.

The best way to facilitate this is to run a research project to identify the best ideas for accessing and mobilising key stakeholders. This should be run through 2006 so as to avoid the loss of momentum that a delayed project might have.

9.6 Other Aspects of Stakeholder Participation

There are several foreign funded projects going on in Kazakhstan on stakeholder participation and related areas, such as the development of Water User Associations. These programmes and projects should be assessed and monitored as potential supporters of the stakeholder process as they may have potential for adapting to RBCs.

9.7 Implementation and Financing

Implementation will be jointly financed through the republican budget and local budgets. Some of the establishment and development work continues to be supported through the UNDP project. Future projects are also necessary and they have good potential for support through grants and loans from international funding institutions.

The plan for improving monitoring of surface waters for 2007-2010 is provided in Table 18.2 in Section 18. This is a summarised plan which will be detailed by Kazhydromet in their annual budgets as normal. The total cost estimate 2007-2010 is 16328 million Tenge ($US 126 million).

10 Rebuilding Capacity in Surface Water Monitoring

10.1 Organisation of Surface Water Monitoring

Surface water monitoring in Kazakhstan is carried out by the State Republican Enterprise "Kazhydromet", which is under the Ministry of Environmental Protection. Under Kazhydromet the National Hydrometeorological Service (NHMS), with its 13 Oblast Hydromet Centres (HMC), manages the surface water hydrometric network, collects and processes the data derived from it and issues reports and bulletins on hydrometeorological information.

In accordance with the budget programs, "Conduction of Hydrometeorological Monitoring" and "Conduction of Surveillance on Environment Conditions", the NHMS carries out the following functions:

- hydrometeorological monitoring of the environment
- short- and long-term hydrometeorological and agrometeorological forecasts
- warnings of hydrological and meteorological hazards
- maintenance of the National Data Base on Hydrometeorology and Environmental Pollution
- provision of hydrometeorological information to state bodies, industry, agriculture, the general population and other sectors of the economy

The NHMS officially informs interested organizations (including CWR and RBOs through the Oblast HMC) on current and forecast conditions of water bodies of Kazakhstan through several bulletins and reports, including:

- annual data on the rivers, canals, lakes and reservoirs of Kazakhstan (State Water Cadastre of the Republic of Kazakhstan)
- long-term hydrological records
- memo on accumulated moisture in the river basins of Kazakhstan for the spring flood and vegetation periods
- data on surface water evaporation
- forecasts of the start and peak of spring floods showing water levels and flood risk zones
- forecasts of ice formation and break-up on the Syr Darya, Ili and Irtysh rivers
- Inflow forecasts for the major reservoirs of Kazakhstan
- short-term forecasts of water availability in rivers
- Daily Hydrological Bulletin
- Daily Mudflow Bulletin
- Daily Avalanche Bulletin
- Weekly Bulletin the Northern and Central Caspian Sea
- Warnings for storms, floods, ice jams, mudflows, avalanches, wind fetch in the Caspian Sea and other hazardous phenomena.
- Annual Data Book on marine stations on the Caspian Sea

The NHMS participates in various international organisations such as the Central Asian programme of the Global Climate Surveillance System under the WMO, the Interstate Oceanography Commission (IOC), United Nations Environmental Programs (UNEP) and the International Council on Science (ICSU) and the Interstate Council on Hydrometeorology as well as contributing to bilateral and multilateral regional agreements and international conventions, projects and programmes.

The assigned functions of NHMS are in line with international standards of a monitoring organisation. However, NHMS is significantly constrained in carrying out its tasks because of the deterioration of its physical network, the loss of trained staff and a reduction in its research abilities, all caused by low operating budgets over the last 15 years.

There are also issues with access to data by the water management organisations and other potential users of water information. For example, reports containing annual and long term records for all eight river basins of Kazakhstan are submitted to the CWR by NHMS but RBOs continue to complain that they have no access to such information on their river basins. It is necessary to close this gap in information access so that RBOs and other information users actually have access to the data they need.

10.2 Approach to Improving Surface Water Information

The rebuilding of the surface water and meteorological network and capacity of NHMS is a significant undertaking with equally significant costs. Therefore a long term, two-stage plan has been adopted.

The First Stage (2007 to 2010) focuses on the development and strengthening of water resources monitoring and access to information. This would highlight improvements in the annual surface water assessments for all river basins, summaries of long-term hydrologic characteristics and their impact on economic activities, as well as the development of standards for the determination of hydrological characteristics.

The Second Stage (2011 to 2025) is aimed at capacity building in water resources monitoring, information networks, analytical centres and information centres at the national level and assessment of methodologies for monitoring and forecasting, with special attention to climate change.

The main target areas of the two stage approach can be summarised as:

- improvement of the regulatory, legal and institutional framework for surface water monitoring
- strengthening of human resources
- rebuilding of the hydrological monitoring network (including equipment)
- improvement of information and telecommunications technology
- development of research programmes in hydrological monitoring
- strengthening capacity in international cooperation

The expected outcomes are summarised as:

- the establishment of a complete hydrometric network capable of supporting integrated water resources management, at river basin and regional levels
- improved regulatory, legal and institutional framework for surface water monitoring
- development of improved information and telecommunications technology for surface water monitoring
- improved research programmes directed at monitoring methodology and assessment of water resources, including forecasting and modelling
- improved approach to the Annual State Water Cadastre
- complete assessment of long-term surface water resources
- a study of the main hydrological characteristics of all river basins prepared and issued
- standards developed for the determination of main hydrologic characteristics
- organisation developed for international cooperation in monitoring of transboundary surface water
- increased staffing and increased capacity for water resources monitoring and assessment

10.3 Improve the Regulatory, Legal and Institutional Framework

Strengthening the legal base ensures the status of water resources monitoring concerning the rights, responsibilities and liabilities of the monitoring organisation (legal and executive bodies of state and local governance, public organisations, etc.) and with respect to its clients on the exchange and use of information. The Water Code and the upcoming Environment Code will both need articles or regulations to specify Kazhydromet's functions and the rights to water and environmental information of government and non-government organisations and individuals.

It will be necessary to make official the procedures and orders of liaison between state organisations and agencies carrying out monitoring and using information from monitoring. Essentially, all information developed by Kazhydromet must be available for any users of information – otherwise, why is monitoring taking place? This is closely related to overcoming fragmentation in water management discussed in Section 6.4 above.

Kazhydromet should hire a legal expert to assess their legal position with regard to rights and responsibilities. The expert should work with higher level administrative staff to determine Kazhydromet's specific legal needs and work with the CWR on amendments to and regulations of the Water Code, as well as those in the Ministry of Environmental Protection who are drafting the Environment Code.

The management structure needs to be improved to make it more efficient and directed at water monitoring, which will minimise costs for the future. This would be implemented through the introduction of regulatory directives to regulate:

1. structure of monitoring and its sub-systems
2. objectives, tasks and rules for conducting monitoring and its sub-systems
3. rights, liabilities and rules of interaction between organisations involved in monitoring

The above are mainly concerned with the development and setting of norms for determining the condition of water bodies that are the basis of assessment and forecasting of surface water resources and decision making in water management.

Regulatory functions also incorporate the introduction of standards that regulate requirements, rules and procedures in respect of establishing and implementing water resources monitoring, its functional components, structural sub-divisions and elements. New methodologies and technologies for monitoring of the atmosphere, surface water and sea environments will also be developed.

10.4 Increase Staffing in NHMS

NHMS has lost many of its qualified, specialised staff over the last decade due to the very low salaries it is allowed to pay its staff. This is a problem across most areas of the public sector and has been raised in other sections of this IWRM Plan.

A specific plan indicating numbers of new staff required and their areas of expertise and training has not yet been prepared by NHMS but will be as progress on budget and salary rationalisation progresses.

10.5 Rebuild the Physical Network

NHMS is currently managing a network of:

- 226 hydrological stations on rivers, lakes and reservoirs
- 248 full meteorological stations
- 19 meteorological posts (precipitation and temperature)
- 16 snow courses
- 2 avalanche stations

According to World Meteorological Organization (WMO) standards, a more appropriate number of stations for a country the size of Kazakhstan would be on the order of 13,000 meteorological stations and 740 hydrological stations (compared with 267 and 226, respectively). The limited number of observation points adversely affects the quality and reliability of hydrometeorological information in terms of current and forecast environmental conditions, including for emergency situations.

This is a special problem on the borders with other countries of the many transboundary rivers in Kazakhstan. Without these it is impossible to determine how much water is coming across the border to monitor international agreements on water. For example, the current agreement with China on the Ili River is for a 50 / 50 split of the natural resource at the border. But no one knows what the natural resource quantity is. Partly this is due to the difficulty in obtaining water use records from China, but it is also due to an incomplete information record in Kazakhstan.

In general terms the hydrometric network may need to be increased by a factor of three or four and the meteorological network as much as ten, which will have a significant cost over the next several years.

An assessment and feasibility study is needed to optimise expenditure and need. The feasibility study and all subsequent planning and implementations should be done in conjunction with the CWR and RBOs as they are the water management organisations and know the priorities of surface water monitoring. As discussed in Section 7.4, a National Water Information Centre is being established to house all water related information. Hydrometeorological information is a part of the overall water information requirements and compatibility between systems must be assured.

Aspects of specific importance are:

- access to satellite based information
- introduction of automatic and mobile monitoring systems
- operation and maintenance of the network
- reconstruction and rehabilitation of administrative and service buildings, meteorological sites, hydrologic stations, ancillary structures, power and communication equipment

10.6 Improve Information Management and Assessment

At present there are no annual assessments of water resources, their quality and water use in many areas of Kazakhstan. This is problematic for all water resources management in Kazakhstan. The NHMS has now started designing methodologies for annual assessments. The NHMS is the best organisation to carry out this important work as they have greater expertise than the RBOs, but the work must be done in full coordination with the RBOs as it is primarily for their benefit as the primary authorities for water resources management.

The long term surface water record has been badly disturbed over the last decade and more by the destruction of the hydrometric network, unfortunately coincident with climate change, glacial degradation and the resulting changes in the hydrological regime. The lack of data is a serious impediment to the design of hydraulic structures and for water resources forecasting, planning and management purposes.

10.7 Enhance Research Capacity and Output

Research on monitoring systems is necessary to keep pace with ever advancing technologies and methods and ensure good information on which to base water resources decision making. Improved research is also necessary to determine appropriate infrastructure investments, appropriate application of methodologies, algorithms and programs and other aspects. Several research oriented programmes are necessary.

Initially some organisation and direction of research is necessary to assist in the formulation of principles, methodologies and rules for specific tasks in water resources monitoring, leading to methodological guidelines for the improvement of surface water monitoring. Specific examples of priority research are:

- the impact of the degradation of glaciers on the water resources of Lake Balkash
- quantification of water consumption upstream of the transboundary Ili and Irtysh rivers
- assessment of multi-year water resources under present climate and environmental conditions by river basin
- development of modern approaches to forecasting water availability
- assessment of Caspian Sea water levels for recent (3-5 years) and long-term (10-15 years) perspectives
- development of modern standards on determination of hydrological characteristics

10.8 Improve International Cooperation

Close involvement in international activity is important to maintain awareness of progress in the rest of the world and to participate as an equal partner in international programmes. Kazakhstan has committed to 19 international conventions on environmental protection and it is necessary to develop implementation programmes. Several global meteorological, hydrological and environmental initiatives are also important to belong and contribute to, such as the World Weather Watch and the World Climate Program.

Kazakhstan also belongs to Regional Association II (Asia) and regional Association VI (Europe) of the WMO which it needs to contribute to. Kazakhstan is also a member of Interstate Councils for Hydrometeorology, Ecology and Environmental Protection. The regional program is targeted at hydrological and meteorological problems, with great importance for transboundary waters on which Kazakhstan is so dependent.

There must be active participation in the preparation and implementation of international projects in hydrology, meteorology, ecology, climate change and other issues related to the activity of the Ministry of Environmental Protection and the Committee for Water Resources.

10.9 Improve Training and Education in Monitoring

Over the last decade many staff have been lost from NHMS and the education system in Kazakhstan has not kept pace with progress in water and environmental disciplines or in their monitoring. It is now necessary to rebuild the education base of NHMS in parallel with increasing staff numbers.

The approach will consist of:

- determining the best institutions in the region and around the world for environmental and water monitoring training
- establishing a training and education strategy
- selecting staff to send on courses
- arrangement of short courses and seminars at the national level to improve staff capacity
- establishment of a library for international journals, text books, reports of conferences and seminars, etc.
- issuing information digests based on the current information on water resources monitoring
- establishment of a computerized library

10.10 Second Stage 2011-2025

The Second Stage of the approach is essentially a continuation of the First Stage, with the same general philosophy aimed at improving the functions of water resources monitoring. This would include:

- continued improvement and harmonisation of regulatory and legal framework
- continuation of improvement and modernization of the monitoring networks
- introduction of automatic and mobile monitoring and provision of laboratories, etc. at the regional level
- establishment of a specific network for assessing the anthropogenic impact on water bodies
- establishment of a unified GIS for monitoring and forecasting of surface water conditions
- continuation of the programme for improving research and the methodological basis of surface water monitoring
- improvement of short-term and long-term water availability forecast in the rivers of Kazakhstan
- continued improvement international cooperation in water resources monitoring, especially on transboundary waters
- continued education and training of staff engaged in ecology, water resources monitoring

10.11 Implementation and Financing

Implementation will be mainly financed through the republican budget with some contribution from local budgets. There is potential for significant proportions of the more expensive works to be supported through grants and loans from international funding institutions.

The plan for improving monitoring of surface waters for 2007-2010 is provided in Table 18.3 in Section 18. This is a summarised plan which will be detailed by Kazhydromet in their annual budgets as normal. The cost estimate for the period 2007-2010 is 16,328 million Tenge ($US 125 million).

11 Rebuilding Capacity in Groundwater Management

11.1 General Considerations in Groundwater Management

In Kazakhstan groundwater has generally not been considered a water resource in the same vein as surface water; hence its management as a mineral resource. This hampers the management of both resources and removes a potentially good water resource from use. There is good potential for conjunctive use of groundwater and surface water combined, mainly in irrigation, but also for industrial and domestic use. Joint management of surface and groundwater is necessary to exploit their combined potential.

Like surface water, groundwater also needs to be protected. Much of the groundwater in Kazakhstan is polluted, either by salts from poor irrigation and drainage management, or by organic and chemical contamination due to the dumping of untreated or insufficiently treated municipal wastewater. The pollution problem is exacerbated by unmanaged solid waste disposal.

Groundwater and surface water need to be managed together, at the river basin level, as the two components of the total basin water resource. These are two of the primary principles of IWRM. To accomplish this, relationships need to be built at the river basin level between the RBO – as the authority for water in the basin – and the Oblast Departments of Geology (DoGs). While it is true that aquifer boundaries do not necessarily match those of the river basin, they tend to approximate each other and, where they don't it is a detail which can be dealt with after the initial institutional coordination is made in each basin.

In Kazakhstan groundwater is classified as a subsurface resource and is therefore managed under the Ministry of Energy and Mineral Resources (MEMR). It is managed under the Committee for Geology and Sub-Soils (CGSS) through the Oblast Departments of Geology (DoGs). Coordination between the DoGs and RBOs varies among the river basins but mostly there is little to no communication or coordination. Groundwater is considered a strategic water resource and information on the resource is not freely available.

The full potential of groundwater as a resource and where it may be used conjunctively with surface water is unknown because there has not been any coordination between the two management systems. This situation needs to change so that all water resources can be considered and managed.

The missing aspect in groundwater is that, while attention is given to monitoring (though this has declined) very little is given to the actual management of groundwater as a resource. The focus on improving groundwater management is therefore to:

1. officially coordinate the management of groundwater and surface water
2. to improve monitoring of groundwater and access to information

11.2 Improve Coordination between Groundwater and Surface Water Management

The legal base is in place in the Water Code and other laws to coordinate the efforts of groundwater authorities and surface water authorities on both quantity and quality issues. It is necessary for the two responsible Committees (Committee for Water Resources and Committee of Geology and Subsoils) plus the Committee for Environmental Protection and the Ministry of Health (Sanitary and Epidemiological Services) to determine how to effectively coordinate their activities for better management. It will be necessary for Ministerial level orders that these bodies will coordinate, at national and oblast / river basins levels.

In Section 6.1 an Interministerial Working Group (IMWG) is recommended. The IWMG has already been established to support the preparation of the IWRM Plan and should continue through 2006 and as long as necessary in order to support the *implementation* of the Plan.

Officially combining the management of surface and groundwater will require a Ministerial order for greater coordination between authorised bodies in water management. This should occur in 2006. Following this, the responsible committees (as mentioned above) should develop a method of improved communication, information access and coordination at all levels, especially the river basin level. At present the DoGs are organised at the Oblast level. This should change in the future, but a start can be made by ordering the coordination of oblast DoGs and the appropriate RBOs. This should be able to be started in 2006 and completed in 2007.

11.3 The Legal Base for Coordination between Ground and Surface Water

The legal base for improving the coordination between groundwater and surface water management is essentially in place. For example, Decree 106 on "Approval of Regulation on the State Monitoring of Sub-soils of the RK" (1997) states that, in addition to the Committee of Geology and Sub-soils and its Oblast departments carrying out groundwater monitoring, all Ministries, State Committees and other central executive bodies, legal entities and individuals, having information on sub-soil conditions are obliged to provide this information to the Committee of Geology and Sub-soil Use of the MEMR. While it is unlikely that the original law was meant to be understood in this way, it legally brings together organisations that have and that use information on groundwater.

Additionally, the 2003 Water Code, in Article 60, regulates monitoring of water bodies, "which shall be conducted by the authorized body for use and protection of water resources (*which is the RBO*), jointly with the central executive body of the RK in charge of environmental protection (*which is the Committee for Environmental Protection*), the authorized body in respect of the sanitary-epidemiological welfare of population (*which is the Ministry of Health*) and the authorized body in respect of geology and groundwater use (*MEMR, CGSS*) – through a jointly determined and agreed methodology. While there is still very little action in terms of implementing the Water Code, this article is of great importance in reducing fragmentation and bringing together the most important bodies in water management. This also indicates the importance of actually implementing the Water Code.

11.4 Improve Groundwater Monitoring (SSWM) Management Systems

Groundwater monitoring is carried out also under the MEMR. Like the monitoring of surface water, the network has deteriorated in the last decade and now needs to be rebuilt and upgraded in order to have information on which to manage this important resource.

The State Subsurface Water Monitoring (SSWM) is a system of regular observations, assessments and forecasts of groundwater conditions to provide information necessary to ensure the rational use and protection of groundwater. The main tasks of the SSWM are:

- groundwater observation
- assessment of groundwater status
- forecasting groundwater status
- maintenance of an information base on quantity and quality of groundwater
- provision of information and recommendations for decision making
- assessment of actions on prevention of pollution and environmental improvement of groundwater

SSWM is a three level information system consisting of local, regional and national monitoring approaches depending on the area of coverage and the depth of investigation. Local level monitoring provides information for operations and protection of groundwater. The information is passed up to higher levels for assessment and decision making.

Regional level monitoring provides information for making recommendations for prevention or mitigation of damage caused by the changes in groundwater conditions and for issuing the Annual Bulletin on groundwater conditions in the respective Oblasts.

At the national level SSWM provides information for preparation of government reports on water availability for domestic water supply, on the general condition of groundwater and a memorandum on emergency situations in groundwater due to pollution or depletion of groundwater. It also provides information for early spring forecasts of maximum groundwater table levels.

Monitoring of groundwater by the MEMR has a legal foundation, notably:

- the Decree of the President of the Republic of Kazakhstan (which has the force of law) on "Sub-soils and Use of Sub-soil Resources" (1996, 1999, 2003, 2004), which simply states (Article 55) that "the state will monitor groundwater for the purpose of record keeping". Article 56 adds to this by stating that monitoring is to "support the rational use of the groundwater resource, ensure prompt identification of changes in the status of the resource, assessment and prevention of damage". The structure, content and regulations for carrying out monitoring of groundwater are established under the GoK.
- The Law on Environmental Protection (1997), in particular articles 24 and 25, provide descriptions and definitions for state and industrial environmental monitoring.

While these laws provide the basis, there is significant confusion and contradiction in the legal base because it has been developed by various agencies, often without regard to other legislation. One result, for example, has been that groundwater monitoring in the industrial environment needs to be approved by the Oblast DEP without any discussion or agreement with the Oblast DoGs. Data on industrial groundwater use is not available to SSWM and consequently not included in their assessments and forecasts for national levels. This is a classic problem of a fragmented water management system and precisely what IWRM has been developed to improve.

It is necessary to clarify the legal aspects of groundwater monitoring and ensure it is better coordinated. For example, monitoring procedures in SSWM are not standardised and existing regulations need to be improved and registered in the Ministry of Justice.

As with surface water data and all other environmental and water data, access to information should be broadened so that all interested organisation have the information they need to make decisions. Procedures and standards also must be coordinated. The system for access to groundwater information by other state bodies and organisations concerned with groundwater resources has not been established. SSWM therefore does not know how to proceed where requests for information are made. It is necessary to establish the system of information access and request for information.

A National Water Information Centre (NWIC) has been established in law under the 2003 Water Code. As yet, it has not been implemented because budgets for it have not been approved. In Sections 7.2 and 7.3 of this IWRM Plan, implementing the NWIC immediately has been strongly recommended. Groundwater information should be included in the NWIC data base.

11.5 Improve the SSWM Information Base at River Basin Level

Effective management of groundwater and its coordination with surface water is best done at the river basin level. A first step is for groundwater information to be redeveloped for river basins. This will require:

- develop a GIS for groundwater to be coordinated with the equivalent for surface water
- new hydrogeological maps at the river basin level
- demarcation of boundaries between surface and groundwater bodies to determine the best way to coordinate with RBOs

It is also important to clarify the method of assessing and forecasting groundwater availability as a component of overall river basin resources.

11.6 Improve the SSWM Observation Network

As has been previously stated, the network for groundwater observation has deteriorated and now needs to be redeveloped, improved and modernised. This will require investments in new hardware, increased access to satellite imagery, software, etc.

11.7 Improve the SSWM Assessment and Information Capability

Current ability for the SSWM in assessment and information management is low and needs to be improved. Part of the improvement will include new, appropriately trained and qualified staff. It will also require increased access to modern assessment methods, software, etc. Assessment of aquifer potential must also be coordinated with the RBO data base. Forecasting groundwater potential is very important, especially where it is to be considered a strategic reserve. Improved assessment capacity will be necessary for forecasting.

11.8 Implementation and Financing

Implementation will be mainly financed through the republican budget. There is potential for some of the projects to be supported through grants and loans from international funding institutions.

The plan for improving management and monitoring of groundwater for 2007-2010 is provided in Table 18.4 in Section 18. This is a summarised plan which will be detailed by MEMR (CGSS) in their annual budgets as normal. The cost estimate for 2007-2025 is KZT 854 million ($US 6.4 million) with an additional annual supplement of KZT 36 million ($US 0.25 million) for staff increases.

12 Improving Land Management for IWRM

12.1 Integrating Land and Water Management

The water bodies of a river basin are intimately connected with the land of the river basin or watershed. The hydrology, water quality and overall health of the river are completely dependent of the health of the watershed. In order to protect the water bodies the land on which it is based must be properly managed.

Land management takes several forms:

- the impact on the watershed of decisions on land development

Ever change to the watershed has an effect on the quantity and/or quality of the water in the rivers and lakes and the aquifers. Even where a single decision for change may have a relatively small effect, the cumulative impact of several changes may be significant.

- management of solid waste disposal

Unregulated disposal of solid waste is a massive problem in pollution of the watershed as a whole specifically in contamination of both surface water and groundwater. Toxins in solid waste seep in the subsoils and enter rivers and lakes as part of surface and sub-surface runoff or percolate to groundwater.

- management of waste water disposal from industry and municipalities

Wastewater disposal in Kazakhstan in very badly managed. Most municipal waste water, which includes disease causing human waste as well as chemical disposal from smaller industries connected to the sewerage system, is dumped into sewage lagoons or directly into rivers. In a very few cases – Astana and Almaty – there is primary or secondary treatment carried out prior to disposal but most cities dispose of it with no treatment whatsoever. Even where sewage lagoons are used they are dumped under ‘emergency’ conditions and, even where they are used legally they pollute groundwater just through the seepage action. All populations downstream, whether their water comes from surface or groundwater, are affected.

- management of quarry and mine drainage

Of special concern is mine and quarry drainage. Disposal of mine and quarry waste is usually done with water. Mine and quarry waste often contains heavy metals and other toxins which end up in groundwater, surface water and, of course, drinking water supplies.

- management of forests

The removal of forests radically alters the hydrology of the basin usually resulting in reduced water retention in the soils, greater initial runoff and lower base flows. This means higher flood risk and flood damage potential, greater soil erosion and reduced access to water during the dry periods of the year. For example, it has been estimated that the expected flow reductions in the Irtysh River from increased water

use in China can be completely offset by reforestation on the upper catchment in Kazakhstan.

- management of agriculture, especially irrigated agriculture

Agriculture is hard on land and that is especially true for irrigated agriculture. Agriculture is also the largest source of non-point pollution. Managing agricultural land is of the greatest importance to avoid damaging land.

In Kazakhstan the worst situation is the damage to the land resources caused by extremely poor irrigation water management. Some of the problem is within the distribution system but the worst damage is at the field level. This is due mainly to the fact that farmers do not know how to irrigate land properly, which should not be very surprising – they have never been trained to do so. Every year land is permanently lost in Kazakhstan to salinisation from poor irrigation management. This is a situation which must not continue (see Section 16 for more detail on improving water use efficiency in irrigation).

The above are just a few examples of where watershed management is important. They indicate how many government and non-government agencies and organisations are involved in protecting the watershed. The Agency for Land Resources Management (ALRM) should be the agency which coordinated the activities which affect the basin and which will serve to protect the watershed in the future. To do will require significant capacity building in land management and an official order to connect the various organisations involved.

Because the RBOs are charge with 'use and protection' of water resources under the Water Code, they must be well integrated with the oblast Departments of Land Resources Management.

12.2 Develop and Amend Legislation on Land Management

The main areas of law that require development or amendment are legalising the interconnections between water managers (CWR, RBOs), land managers (ALRM and its departments), environment managers (MEP and its departments including forestry) and agriculture managers (MoA). Laws on land management itself will need to be amended as well as the Water Code and the upcoming Environment Code.

Other sections of the plan have identified the need for legal specialists and technical specialists to assess the existing legislation and determine where amendments are needed and develop drafts for approval. Land management concerns will need to be included in that. A study on legal reform will be a necessary first step.

12.3 Develop New Regulations on Land Monitoring

Regulations for monitoring of land resources also require improvement. Mainly this has to do with access to information which will need to be broadened for all organisations which impact on the watershed to share information. Current legislation lists mainly the ALRM and its oblast departments as monitors and managers of information, but the state enterprise RSE "GosNPTSzem", including its daughter companies also carries out land monitoring. Several other ministries, agencies, R&D Institutions, NGOs etc., do carry out their own observations on land condition but

there is no means of coordinating their activities with those of the assigned land managers or watershed protectors. There is also no coherence between the various monitors and duplication is also common. Established and standardised monitoring and assessment procedures are often not followed leading to confusion in the information and rendering much of it invalid.

There are existing regulations (specifically: “On Approval of Rules for Conduction of Land Monitoring and Application of its Data in the Republic of Kazakhstan”, developed in 2003), which authorised ALRM and its departments as the monitoring organisation but it is insufficient to improve the situation in.

It is necessary to develop a regulation for a standardised system so that the various organisations that monitor can do so in an organised way and thereby improve the overall base of information.

12.4 Improve the Monitoring Network

Current legislation on land monitoring does indicate that monitoring is to be financed through the republican budget but, like other areas referred to in this plan, budget allocations have been insufficient to carry out monitoring, maintain the infrastructure of the network or to maintain staff. This has led to a loss of capacity in the monitoring organisations and a deterioration of the network. Now the network coverage is tiny for a country the size of Kazakhstan. Some observation work continues under these conditions but it is insufficient to base management decisions on.

The network of observation points needs to be increased to a minimum of one per cadastre block. In addition there is need to have more frequent monitoring in a denser network in areas of special interest such as:

- those where environmental damage has already been done (Aral Sea, Semipalatinsk, Lake Balkash, Caspian Sea, to name the major ones)
- areas where ecological protection plans or projects are ongoing
- near solid waste dumps
- near mine and quarry disposal sites

The above are a few examples of locations where additional land monitoring observation points are needed. Oblast departments of the ALRM must be consulted on any proposed changes in land use so that they can determine the monitoring needs.

With the increase in private sector ownership of land and the very rapid development of that land in some areas the government must move quickly to establishing rules and regulations governing changes in land use itself, as well as monitoring. Anywhere where changes to land use are being considered requires additional monitoring well before any changes begin to establish a base line on which to monitor changes in soil, water and land. Establishing observation points must be linked by law to any planned development in the basin. In the case of private sector development, the establishment and operations of observations points should be paid for by the developer. This will require an amendment to the Water Code and the Environment Code and likely in other laws governing land development and the responsibilities of land owners.

It is necessary to develop standards for land monitoring. At present several organisations or agencies carry out monitoring, as noted in Section 12.3 above. A set of standard procedures for locating observation sites, monitoring itself and assessment and management of data is required. Information on standards are available from other countries, especially European countries with their comprehensive environmental legislation. A study to develop new and upgrade current standards should be carried out and the results prepared as regulations and amendments to law.

Monitoring networks and the whole approach to land assessment needs to be modernised. This includes such aspects as:

- the introduction of modern remote sensing techniques, mostly satellite based
- automated data collection and transmission
- procuring mobile laboratories
- improved information management systems
- the introduction of GIS as the information platform, etc.

Activity at the oblast and river basin level needs to be increased. Land management centres need to be established and the oblast level, with affiliates at regional and national levels. During the period these are being established work must be carried out at the national level and the river basin and oblast levels to strengthen and institutionalise coordination between the various organisations involved – the ALRM station, Akimat, DEP, DoG, RBO, SES, and others.

12.5 Implementation and Financing

Implementation will be mainly financed through the republican budget but there is significant potential for certain projects and network expansion and improvement to be supported through grants and loans from international funding institutions.

The plan for improving land management and monitoring for 2007-2010 is provided in Table 18.5 in Section 18. This is a summarised plan which will be detailed by ALRM in their annual budgets as normal. The cost estimate for 2007-2010 is KZT 4,121 million ($US 30 million) with additional costs for staff increases which have not been calculated.

13 Improving Information Management

13.1 The Current Situation

To ensure good management and decision making in water resources management it is necessary to have good and reliable information on many aspects pertaining to the water resource and its uses and water management facilities. The basis for obtaining such information is a well-developed monitoring system. However, information is not just about monitoring systems. Monitoring for the sake of monitoring, producing data which is not utilized, is a waste of time and money. It is necessary to develop and information structure in water resources management in Kazakhstan and to develop processes for the exchange and management of information.

Currently the information structure in the water management sector is not well developed. The absence of good equipment and modern technologies, the lack of staff training on how to use modern software, the lack of skills in using electronic forms of information processing all contribute to the problem.

There have been some modest improvements in the last few years. The CWR and RBOs have obtained computers and some training through various international projects, but it has been insufficient to make a serious step in improving information management.

For the design of a viable and economically sound monitoring program it is necessary to first understand the information needs. Because of the very poor climate of information access and exchange among monitors and users of information in Kazakhstan there is very little knowledge of what data exists and what information may be available. It is impossible to make sound decisions on improving monitoring and information in the water sector.

The converse is also true. Organisations involved in water management do not have a clear idea of their own information needs, which worsens the difficulties in the exchange of information between organisations. This situation results from the destruction of the CWR, RBOs and other government organisations over the last 15 years. Loss of trained staff and equipment, gradually reducing the ability to monitor, assess information and make informed planning decisions has left the organisations unable to carry out these tasks or understand the information needs to do so.

It is necessary therefore to simultaneously:

- improve and rebuild the monitoring network (see Sections 10, 11 and 12)
- improve access to information among the various organisations (see Section 6)
- strengthen all organisations in information management (see Sections 7, 8, 10, 11, 12)
- rebuild capacity in the key water management organisations so they have the ability to use information (see Sections 7 and 8)
- improve the information management systems (Section 13)

The legal basis for improvement of access to data and information has been set out in the 2003 Water Code. However, there has been very little activity on implementing the Water Code. It is now time to do so.

On the subject of access to information, it should also be noted that all water information should be freely available to all users – whether government or otherwise. The Aarhus Convention, which Kazakhstan has adopted, makes all environmental data freely accessible and this includes water information. However, it is recognised that it may take some time before the signing of a convention results in positive actions. Therefore a first step would be to develop Framework Agreements for Cooperation among the organisations which monitor and/or use water information. It will be necessary to initially open avenues of information exchange so that the organisations can know what information is available. This will also require developing a set of regulations and procedures for how the exchange may take place.

At present there is not a good base around which to establish information management infrastructure. The CWR and RBOs are without specialised departments for information management (see Sections 8 and 9). Such departments have been recommended several times through various assessments on capacity building in CWR and RBOs. In 2004 there was an attempt to establish the National Water Information Centre (NWIC) under the CWR, which was called for in the Water Code. However, a budget to establish the NWIC has been consistently refused and NWIC is still not in existence.

Because there are so many organisations involved in water use and water management it is necessary to establish a unified information space (UIS) to which all information users will contribute and access. The NWIC is the core of a UIS.

Such an information system has precedent in Kazakhstan. Many other state bodies have their own internet portals for information access. This now needs to be established for CWR through the NWIC. This will be a good start and act as a catalyst for the further development of the whole of the information infrastructure for the water sector and as a base around which to build the UIS.

13.2 Main Objectives in Improving Information Management

The main objectives of improving the processes of the management and sharing of information and the development of an information infrastructure in the water sector are the following:

- to promote dissemination of information on current and future conditions in water resources and the environment in river basins
- to improve public awareness and public participation in decision making
- to promote transparency in the decision making process
- to support the development of the various monitoring systems
- to ensure availability of and access to information in national, regional and sectoral information systems and data bases

13.3 Build Information Capacity in CWR and RBOs

All organisations involved in the water sector need capacity building in the areas of monitoring and information. References have been made to some other organisations in Sections 10, 11 and 12. In this section the emphasis is on CWR and RBOs.

The first step is to carry out an assessment of the needs for new and modern equipment, along with appropriate software, which will provide CWR and RBOs with the infrastructure on which to base their capacity building. Much of the computer and communications equipment must be of a fairly high spec for GIS and data base management. GPS systems are also necessary to locate monitoring areas. Once the assessment is complete the recommendations can be adopted and equipment procured.

Training of staff on how to work with modern information technologies must parallel equipment purchase. Training should be oriented toward several different target groups, including:

1. application and management of information
2. use of modern computer equipment
3. use of modern information technologies: internet and LAN, database, GIS, special software for various aspects of water management

Some training of RBO and CWR staff has been carried out under various internationally funded projects, including this UNDP Project assisting CWR to prepare the National IWRM and WE Plan. This training will continue through the reminder of the project but it is only a small part of the total training that is needed. The Government of Kazakhstan needs to approve training budgets to facilitate further training.

Training must also be seen as an ongoing investment in improving water management and training budgets must become a specific component of annual budget assessments. Similarly, equipment is in constant need of upgrading and replacement and requires annual budgets for improvement.

13.4 Identification of Information Needs

As noted above, there is currently a poor understanding of what the information needs are of each organisation involved in water management. Part of the training must be on information needs. However, the most important part will be ensuring that each organisation that monitors or otherwise manages information on water make the information available to all others. Initially this may be restricted to providing information on what water information is being collected and available post processing. But eventually there must be sharing between all organisations.

The identification of demand for information needs to be made the river basin level. Here, the assistance of RBCs will be of great value. Members of the RBCs are water users in its various forms and will be able to identify what information is available, where it is lacking and what monitoring needs to take place to gather this information, and which organisation should be made responsible for the monitoring. The following list provides initial ideas on aspects to consider in identifying information needs:

- development of a list of users of information and a list of suppliers (monitors) of information
- ensuring organisations which are charged with monitoring, especially of water infrastructure, are doing so
- analysis of water use and economic in the river basin (which may be done through questionnaire surveys) to compile a realistic data set of water demand
- determine the difference between information used for policy formulation and that used for day-to-day operational management

Organisations responsible for use and protection of water resources (RBOs) should lead the identification of specific information requirements, but in full collaboration of others, most easily accomplished through the RBC.

As this initial identification list develops, priorities will also be identified. Differing types of information have differing levels of urgency and how and when the various types should be received must also be considered.

Information needs vary and change through an evolutionary process linked with the development of water activities in the river basin or as a result of changes in policy or goals. Monitoring and information programmes need to be sufficiently flexible to be update and revises as necessary. Regular reviews on information needs are necessary as part of an overall information strategy for the basin.

13.5 Improve Coordination between Organisations on Information

Information pertaining to water and its management should be freely available to all potential users of information. Primarily these are government bodies at national, oblast or river basin level. Ideally such information should be available upon request but it is recognised that rules and procedures are necessary under the present conditions.

Official procedures for access to and exchange of information should be developed where they are not already in place. Agreements between specific bodies can then be developed based on the procedures which will outline content, timing, etc. The CWR and RBO should lead this process and be given legal status for the regulation of information exchange.

Other procedures for access to information will need to be available for requests which are out of the ordinary either in terms of content or organisation. It must be remembered that such procedures must be clear and simple to assist with the process of obtaining information, not hinder it. All people and organisations have the right to access this information under the Aarhus Convention.

13.6 Establish the Basis for Information Infrastructure

Information Departments need to be established at CWR and all eight RBOs. These have been recommended many times through several projects assessing the capacity of these organisations. Indeed the RBOs and CWR themselves frequently express the need for them. They are well aware that the lack of access to information hinders the work they are charged with doing under the Water Code. The initial goal

of the Information Departments will be the development of the technical basis for a future information space with respect to the use and protection of water resources.

The proposed National Water Information Centre (NWIC) also must be established and developed. The NWIC was initially ordered in the Water Code but all attempts since the adoption of the Water Code in 2003 by the CWR to obtain a budget to establish it have failed. The NWIC will be engaged in setting up and maintaining the Unified Information System (UIC) for the river basins in Kazakhstan. The NWIC will need to be explicitly coordinated with the information departments of the RBOs as it is the RBOs which will generate most of the information. This will also require opening an information portal.

In this world of inexpensive high speed internet communications, the internet itself provides the platform for much of the information dissemination. Various forms of information obtained through the NWIC should be hosted on the CWR website. An electronic library providing links to journals and other important periodicals should also be hosted on the CWR website. The internet allows a good degree of 'openness' and access to information by the general public.

13.7 Establish and Maintain a UIS at River Basin Level

A Unified Information System (UIS) is simply a means of ensuring that information coming from all river basins is in the same format and data collected in the same way so that comparisons can be made from one river basin to another. While this is simple in theory it does require considerable documentation and establishment of methodology. Priority measures to 2010 are:

- design the GIS database for UIS, including the design of the overall GIS structure, according to the procedures agreed for the UIS
- data entry to the database with information on water objects and water management systems and hydraulic structures entered at the time of the inventory described below
- clarification of the river basin boundaries using modern geo-information technologies and entering of information into UIS (at present the system inherited from the Soviet period is still used in Kazakhstan and no longer meets require). The result will be officially approved boundaries for river basins, water management rayons and water management sites.
- inventory of water bodies, water management systems and hydraulic structures within river basins
- transfer of old Soviet State Water Cadastre into electronic format. At present the majority historical data series and information pertaining to water resources is stored on paper, which makes working difficult and is bad for data security.

13.8 Implementation and Financing

Implementation will be mainly financed through the republican budget but there is significant potential for projects regarding the development of information systems to be supported through grants and loans from international funding institutions.

The plan for improving information for 2007-2010 is provided in Table 18.6 in Section 18. This is a summarised plan which will be detailed by CWR, RBOs and others according to their involvement within their annual budgets as normal. The cost

estimate for 2007-2010 is KZT 1037 million ($US 8 million) with additional costs for staff increases which have not been estimated. There will also be continuing annual costs to support the continuation of this work after 2010 which have not been determined.

14 Improving Education and Public Awareness

14.1 Current Educational Situation

Over the last fifteen years there has been a massive (90%) reduction in staffing of RBOs and CWR. The numbers are similar in other organisations involved in water management. Many of those that remain are of lower levels of skill than is required for managing water. This leaves the management of Kazakhstan's water resources in the hands of too few, too poorly trained people. The obvious answer is to begin now to recruit well trained, competent people to rebuild the water management organisations so that they can competently carry out their functions as assigned under the Water Code.

However, simultaneously, the educational institutes of Kazakhstan have had similarly destructive budget cuts and the research and educational institutes have lost many of their best teachers and researchers. This is now an education gap of about half a generation, which is highly visible in water management organisations and educational institutes alike. The consequence of this is that there are not enough trained people that can train the people needed to do the work.

Similar to the rebuilding of the water management organisations, it will take many years – a decade at least – to rebuild the education system. The effort to develop an educated workforce for water management must therefore be a two-pronged approach:

- strengthen the level of education in water management organisations through foreign study
- rebuild the education system so that in the future foreign study can be reduced

14.2 Recent Initiatives to Improve Education

Kazakhstan has made recent progress toward redeveloping its education system in general. Kazakhstan has ratified 1997 Lisbon Convention on the recognition of qualifications pertaining to higher education. In 1999 European countries signed the Bologna Agreement on the creation of a "uniform educational environment" which will result in a uniform system of higher education by 2010.

Kazakhstan is also working toward integrating into this educational community. The two-stage educational system of Bachelor and Master degrees was recently introduced in the higher education system of Kazakhstan, enabling national education to be recognized in the world community and allowing students and teachers to study or work abroad.

A "Concept of Educational System Development" has been drawn up aimed at a target year of 2015. It calls for steady development of the educational system to bring it into conformity with world standards. These reforms follow the Lisbon Convention adopting it for conditions in Kazakhstan.

14.3 Education Specific to Water Management

At present Kazakhstan has about 30 higher institutions and colleges, both state and private, which offer Bachelor degrees and Engineering degrees either related to or specific to the water sector. They range from more general environmental disciplines to the more highly specialised of chemical, biological and engineering aspects of the water environment.

Typical areas of study included in the State Standard for water studies includes: hydrometry, hydrogeology, hydraulics, engineering hydrology and discharge regulation, reconnaissance of groundwater, complex use and protection of water resources, water supply and sewerage systems, use of water energy, hydropower units, irrigation, hydraulic structures, operation of water facilities, regulation of river courses, improvement of quality of natural water, waste water treatment, water economy and etc. These courses cover all sectors of human activity in water and environment: agriculture, industry, communal services sector, etc. These are all necessary for the education of water management professionals.

One of the problems in water education is that the university curricula are out of date. Mostly, it remains purely technical. The approach to water management has progressed rapidly around the world in the last two decades, more or less coincident with the most difficult economic and social period of all of the former Soviet states including Kazakhstan. Areas which need to be introduced or enhanced include the integrated nature of water management, a stronger involvement with ecological aspects, the importance of society and the emphasis of good governance.

Educators in Kazakhstan also acknowledge that education is based entirely on classroom work with very little practical training. Partly this has been due to the lack of money for field excursions, laboratory work, etc. but it has now resulted in a culture of a classroom based curriculum.

Educators also blame the budget cuts to education and the low salaries which mean that universities and colleges are starved for even simple educational tools and attracting new educators is practically impossible. With the rapid growth of the private sector in Kazakhstan, this situation will only worsen unless Central Government takes appropriate steps to reverse it through better funding.

Water management requires a high level of education, usually at least to a Master's degree level, usually six years of post-secondary education in total. Yet because of the budget cuts and low salaries in the water sector, very few young people are attracted to this discipline.

It is necessary now to acknowledge the constraints to water management education and make the required changes.

Similar to the rebuilding of the water management organisations, it will take many years – a decade at least – to rebuild the education system. The effort to develop an educated workforce for water management must therefore be a two-pronged approach:

- strengthen the level of education in water management organisations through foreign study
- rebuild the education system so that in the future foreign study can be reduced

In addition, it is necessary to increase environmental and water education in schools from the earliest level to develop a culture of water awareness. This leads to an improved public understanding of water issues which creates a better informed public as well as inspires young people to become the water managers of the future.

14.4 Educate Specialists Abroad

As discussed above, it will require significant reforms of the education systems as a whole and a concerted effort from central government to institute the reforms, if the education system in Kazakhstan is to produce well qualified professionals for all sectors of the economy, including water management. Even if these reforms were to begin today it will still take several years to restore confidence, to attract educators and researchers and to attract students to the water management disciplines. Therefore a parallel step must be to send students abroad for education.

The students who are sent abroad will become both water managers and other related professionals as well as the next generation of educators. It is necessary to train new educators and researchers in modern approaches to water and environmental management as practically an entire generation of educators and managers has now been lost.

An initial estimate of a foreign student programme is to select 10 students each year for 10 years. This would provide a minimum number of professionally trained people to work within the water management sector and begin to rebuild the research and education system for water and environmental management. To repeat, this is a minimum number.

The foreign student programme should be aimed mainly at European universities because of the European Union Water Framework Directive (EUWFD). As described in Sections 3.3, 4.1 and 15.5, Kazakhstan should be directing its water management efforts at adopting the approach of the EUWFD. It follows that today's students should be learning the EUWFD at its source. The foreign education programme should include water ecologists, water resources planners, environmental economists and legal specialists. Legal specialists should include those interested in transboundary or international water law as the need and urgency for developing the legal basis for cooperation in water management in Central Asia is growing. This is further discussed in Section 17.

Sending students abroad can begin in 2007 as it will be too late to apply to European universities for the beginning of the 2006 academic year. This allows time for preparing a programme for sending students abroad and establishing selection criteria. The foreign student programme should be monitored and re-evaluated annually to identify specific areas where increases are needed or when the universities in Kazakhstan are sufficiently well staffed that foreign education is no longer necessary.

14.5 Improve Higher Education in Water Management

At present in Kazakhstan there are too few specialists trained in modern approaches to water management in the university system to produce the number of graduates required to rebuild the water management organisations. However, there are some

very skilled and highly qualified specialists which can lead the redevelopment of the education system.

First, the CWR and MEP need to appoint an education liaison position to identify education needs in their respective disciplines in order to be able to report these and coordinate with the education system, under ME&S.

Secondly, a team should be created to review the current system of water management education and make initial recommendations on how to improve it. The CWR and MEP education liaison person should both be members of this team. This team should conduct a study tour of three or four universities across Europe to learn their curricula and assess the potential for adopting them in Kazakhstan.

During the study tour the team should determine the possibilities of foreign water management academics visiting Kazakhstan for lecture tours and other teaching activities.

Following the study tour a Strategy for Improving Education in Water Management should be prepared outlining how to adopt the curricula from other universities, what study materials are required, translation requirements, etc. as well as a cost estimate and a schedule of actions. The Strategy should also include a plan for visiting foreign lecturers.

Based on the Strategy, a further assessment and report should be prepared on training and study materials that will be required and how they may be processed and manufactured.

Technical colleges also need to be targeted to determine their contribution to training laboratory, field and other technicians that are also needed for water resources management.

Final Note on Financing

The amount of money in Table 18.7 in Section 18 on financing improvements in the higher education system for water management training represents only that needed for the specific programmes to start the improvement. Significantly more money will be required for computers and other equipment specific to water management along with the other, more usual, university expenses.

It will be very difficult to attract high quality educators to the universities and research institutions with the very low salaries that are currently offered. Serious consideration must be given to raising the salary levels of university and college teachers and researchers.

It will also be necessary to increase access to universities through improving the educational grants and loan system. The system can also be used to provide certain incentives for students to choose water management over other courses which may be producing a sufficient number of qualified graduates.

14.6 Introduce Water and Environment into Schools

Education in water and environment in the primary and secondary schools is a very effective way to increase public awareness, to create a population with a strong

sense of the value of the environment and to develop a good group of young people interested in careers in water and environmental management.

The Ministry of Education and Science needs to make the decision to include environment in its primary and secondary curricula. At present discussion of environmental issues in schools occurs occasionally and without any kind of directed programme of environmental education. Water as a subject in itself receives no consideration in the classroom.

Starting in 2004 only eight schools participated in the pilot phase of the "Project on Mitigation of Environmental Impacts" conducted by the Central Asian Regional Environment Centre (CAREC) together with the Field Studies Council. The goal was to prepare a methodological guideline for environmental education in secondary schools under the framework of the project "Environment for Future Generations". CAREC produced the excellent textbook of the same name outlining environmental issues in Kazakhstan which has a full chapter on water and water use.

However, since the preparation of the reports and textbook, implementation and publishing of the textbook has been slow. As a first step this textbook should be fully endorsed and adopted by the ME&S and distributed to all schools in Kazakhstan.

A programme to train teachers of primary and secondary schools across the country should be developed and teachers selected and trained. Advice could be sought from abroad as schools in Europe and North America have environmental courses as part of their curricula. This could start as a pilot project in 2007 and 2008 and be developed and expanded into the future.

Computer and internet access will need to be improved in schools as this allows students access to some of the best learning tools on water management. There is a significant and growing base of information on water and environment available in the Russian language on the internet which should be accessible by school children.

14.7 Increase Public Awareness of Water Management Issues

The level of general public understanding of water issues in Kazakhstan is very low. As the public is an important force in improving water and its management it is important that there is a good understanding of the issues and of the place in the management and decision making process of civil society. Public Awareness also stimulates social activity in public concerns like water and its management which is valuable to drive improvements.

Public Awareness (PA) programmes or campaigns in Kazakhstan may have several modes, as described below:

Marketing Mode

- Working with the mass media - According to the social survey conducted in 2005 under this UNDP Project, the most popular mass media outlet in Kazakhstan is TV, followed by newspapers and radio. This indicates the need to emphasise the production of water-related educational programmes. Newspapers are also very popular, indicating the value of press releases.

- Distributing press releases and organising press conferences - Almost every water management organization in Kazakhstan has an official obligation to inform the public about its activities. The RBOs and Vodokanals should pay heed to this obligation and devote more attention to it.

- Information presented on water bill inserts - At present water bills in Kazakhstan contain paid private advertisements. This space could be used at time to promote such things as water conservation and other issues water service providers or management authorities wish to highlight.

- Using advertising-type slogans on streets and in buses - Local authorities could finance such programmes themselves or cooperate with private sector sponsors to put forward issues of concern to the public in water.

- Sponsoring competitions for journalists - Each year there are journalists competitions on the environmental issues organised with the support of Asian Development Bank. This idea should be taken up by national government and local administration.

- National water day festivals – In addition to World Water Day, many countries hold national water days to promote water conservation and other issues. These are typically festive occasions with theatrical performances, concerts, exhibitions, etc. organised for public enjoyment, but with a message.

Educational Mode

- Using websites – These can be colourful with pictures and useful information on the water resources of the country, highlighting concerns, issues and achievements in water management and environmental successes. The information is useful for a wide audience: students, school children, designers and the general public. Such a website would be highly valuable in Kazakhstan which has very little web space devoted to good, complete information about water.

- Education of public officials, decision-makers, authorities, agencies – This is crucial because they are the decision makers whose support is necessary for new programmes. This can be done through consultations, reading materials, posters in offices etc.

- Targeting adults - Public awareness on water does not have to be directed specifically at water. It can also be about environmental civil rights, for example. Such an approach can be an effective tool in building social consciousness.

- Targeting youth – Organising open lectures in universities and colleges on principles of IWRM, water conservation and environmental sustainability are popular and informative. There are many international projects operating in Kazakhstan, with a wealth of good international and local experience which can be shared through educational institutions inviting them as speakers.

- Targeting children – Encouraging the production of cartoons about water for children, for example, could be used to put across specific points. In all summer camps there should be a requirement to organise at least one day devoted to topics of water conservation where children can play water games, participate in competitions, watch educational cartoons on water and other such activities.

Local or Social mode

- Involving civil society into the decision making process - One of the initiatives to further the involvement of civil society in the water management process is the establishment of River Basin Councils. Their further development will require the support of national government, and local administration.

- Integrating NGOs – NGOs can be very beneficial to reaching the general public on issues such as water and environment and should be supported to a greater extent than they are now.

The most effective campaigns combine elements of each of the modes described above. PA campaigns can have a unique contribution to the overall public policy on water and environment. Public involvement in policy is important because governments cannot expect full acceptance of new policy without public awareness. PA is an essential element of successful public policy tools.

A key element and first step is introducing water issues into the school system, as discussed in Section 14.6. School children learn about water and its importance and the need for good management and later become adult voters and water users which have an understanding of the issues. Additionally, it is a well known that children act as an information conduit to their parents, providing them with some knowledge of their own and accelerating the knowledge process.

In previous sections of this National IWRM and WE Plan reference has been made to capacity building in CWR and RBOs and to the creation of information departments within them and the creation of the National Water Information Centre. There is also a need for a Public Awareness Department of CWR, replacing the outdated 'Public Relations' department which limits its work to putting some information on the CWR web site and issuing press releases.

The drive to improve information within the RBOs and CWR and to create information departments will also serve to help promote public awareness if they are properly developed. In developing the Information Departments, public awareness should be one of their key considerations. They are providing information not just for their own use, but for the public as well.

Therefore, it is necessary to ensure the Information Departments in RBOs and CWR prepare information for public awareness needs in addition to their other information functions. The PR Department of CWR should be expanded and changed into a real Public Awareness Department.

Section 13 (on improving information) calls for the development of a Unified Information System (UIS). The UIS will be a very important tool in public awareness and should be developed as recommended.

Water management goes well beyond the water management organisations. Almost all government ministries have an impact on water either as a user, a potential polluter or contributing to its management or funding its management. As part of the integration process it would be valuable to run short training courses on water issues with all government bodies. This could be done relatively cheaply through using various experts across the spectrum of water management organisations to prepare

short lectures as part of their routine work. Some additional money is required for support.

14.8 Implementation and Financing

Implementation of the improvement of education and public awareness will be mainly financed through the republican budget but there is significant potential for projects and programmes to support improved education to be supported through grants and loans from international funding institutions.

The plan for improving information for 2007-2010 is provided in Table 18.7 in Section 18. This is a summarised plan which will need to be detailed by the main organisations such as CWR, ME&S and others within their annual budgets as normal. The cost estimate for 2007-2010 is KZT 1924 million ($US 14 million) with the bulk of this money for increases in computers, etc. into schools. There will also be continuing annual costs to support the continuation of this work after 2010 which have not been determined.

15 Instituting the Management of Water Quality

15.1 Water Quality Management in Kazakhstan

Perhaps the single biggest concern in water management in Kazakhstan is water quality. Many rivers and lakes are badly polluted. Over the last decade and more all organisations that were involved in protecting water resources have been reduced to mere skeletons of their former stature. Indeed there is now no organisation in Kazakhstan which has the specific and clearly defined mandate to be responsible for managing and improving water quality in the rivers and other water bodies of Kazakhstan. This statement has been countered by some claiming that MEP manages water quality, but this is not true; between Kazhydromet and DEPs what they do is monitor, which is not management.

At the same time the monitoring of water quality and the health of rivers has been dramatically reduced in the main monitoring organisations, Kazhydromet and the Department for Environmental Protection. River Basin Organisations (RBOs), who previously had their own water quality laboratories prior to independence, now have none and no staff with water quality training.

In summary the situation on water quality is this:

- no one is managing water quality because no one has the responsibility to do so
- there is insufficient information on which to base decisions on improving and managing water quality

Much of the work needed to be done to improve water quality is discussed in other sections, on CWR, RBOs, monitoring, education, etc. and only the most important points are raised and repeated here. The short coverage this section gives to instituting water quality management does not reflect its importance.

15.2 Formalise Responsibility for Water Quality Management

With no organisation currently having responsibility for water quality management a decision is urgently needed on where the responsibility should lie. According to the 2003 Water Code the RBOs have the responsibility for the “use and protection of water resources”. This implies many elements of IWRM, including protecting the water quality (and its improvement and management) as well as watershed protection which contributes to water quality management. However, this definition of responsibility is very vague and likely insufficient to ensure budget appropriations for the redevelopment of the RBOs’ water quality capacity. A decision needs to be made and subsequently developed into an amendment to the Water Code and a full set of regulations to support this function of the RBOs.

From an IWRM perspective it is clear that RBOs should have the responsibility for water quality management. The management of water quantity and water quality must be integrated and the best way to do that is to manage them within the same organisation. There is precedent for RBOs to manage water quality (as they did during the late Soviet period) and it would not constitute a transfer of function from another organisation as no other organisation has this responsibility.

The Interministerial Working Group (IMWG) established for the preparation of this National IWRM and WE Plan has been recommended to stay in place through the earlier stages of implementation of the Plan. The IMWG should hold a special session to discuss and agree among its members where to place responsibility for water quality management and make its recommendation to government. Following the recommendation to government a process of formal approval by government is required, followed incorporating it into law and regulations.

Making RBOs responsible for water quality management does not mean it will take over all monitoring responsibilities. Rather, in the spirit of integration, coordination between the various agencies involved is the key to successful management. However, RBOs will need to carry out some of their own monitoring, supplementing that carried out by other organisations.

15.3 Formalise Coordination between Monitors and Managers

The decision process for responsibility for water quality management through the IMWG will also serve to bring together and catalyse cooperation and coordination between the most important organisations in water quality management and monitoring – Kazhydromet, the Ministry of Environmental Protection (MEP) and its Oblast Departments of Environmental Protection (DEPs) as well as the CWR and the RBO. Additionally, the MES and its Oblast DoGs are important in overall water quality management because of their role in groundwater management and monitoring, including quality. Oblast SES offices also carry out water quality monitoring and need to be coordinated into the overall programme. Section 6.4 presents the need to decrease fragmentation in water management. Coordinating the water quality and water quantity organisations is a component of that larger picture.

As noted in Section 8.3, the RBOs will need to have their own water quality labs so that they can respond to particular threats to water quality or other situations. The RBO must therefore be very closely linked with the other monitoring organisations.

15.4 Ensure Coordination between Water Quality Managers and Water Users

To integrate the management of water quantity and quality it is necessary for the managers of both to be coordinated with all organisations who use or potentially pollute water as well as organisations that protect water and who use and may damage watershed conditions affecting water quality.

These relationships at the river basin level must be formalised in order to work effectively. The IMWG should also determine what government decrees are need to formalise these relationships and ensure that they are adopted by government and decrees made.

15.5 Adopt the EUWFD Approach to Water Quality Management

The European Union Water Framework Directive (EUWFD) is considered the most important piece of water or environmental legislation ever produced. Each EU member state has the obligation to adopt the principles of the EUWFD and meet its requirements. Outside the EU there is no legal requirement to do so, but its approach

is widely considered to be the best and many non-EU countries are already adopting its principles.

It is a very complex piece of legislation and it is unnecessary to try to repeat any of it here. However, a few very important basics illustrate its direction:

1. water, including water quality, is managed at the river basin level

In the EU, this means even where rivers cross national borders they are to be managed as a single unit. Water quality is considered of equal importance to water quantity so the quality of water crossing a border needs to be a major concern of the water management organisation. Transboundary water management is of concern to Kazakhstan as a signatory to the Convention on the Protection and Use of Transboundary Watercourses and Lakes (commonly known as the Water Convention). The Water Convention requires its signatories to ensure that the water quality is not damaged before being passed to the downstream country.

2. the river basin is managed as an 'ecological unit'

Previously, around the world, river basins were managed more as 'economic units' ignoring the ecological and environmental aspects of the basin. The realisation that such an approach to water management damaged the economy as much as the basin itself led to the new approach of an ecological unit. Economic considerations remain the only driver for water management in Kazakhstan, which is very well indicated by the poor state of the health of its water bodies. In the EUWFD approach there is a model to follow to change and improve this situation.

Perhaps the single most important aspect of the ecological unit approach is that it is basin specific. It presents the question: What makes this river healthy? For example, the lower Syr Darya is a very different river from the Irtysh and their health will be differently defined and the management of their water quality similarly different. This removes the need to follow a national set of standards and allows standards to be set at the river basin level. It simplifies water quality and river basin management.

Another important change within the EUWFD is the increased use of biological indicators of the health of the river. The underlying philosophy is that if the plant and animal life in the water body is healthy, the water body must be healthy; where they are not, there are identifiable problems.

3. that 'good ecological' status must be achieved in all water bodies of the river basin

While the approach may differ from one river basin to another, each RBO is working to achieve the same thing – healthy rivers and lakes – defined in the EUWFD as "good status". It will take time to achieve good status in the river basin of Kazakhstan, perhaps 20 or 25 years, but every step is an improvement and the first step is the adoption of the principles of the EUWFD.

Adopting the principles of EUWFD requires a significant commitment of effort and money. First, water managers, including water quality specialists and ecologists must learn the EUWFD. Initially this will require sending water management specialists abroad, to European universities to study water management within the EUWFD environment.

15.6 Prepare a National Strategy for the Improvement of Water Quality

A Strategy for the Improvement of Water Quality was prepared for the CWR under the British DfID funded Nura-Ishim River Basin Management Project (Final Report, January 2004). This is a very preliminary set of steps but can serve as a starting point for CWR to prepare their own Strategy. As discussed in the previous section, adopting the principles of EUWFD and sending students to learn the details will be the first step in the Strategy.

As discussed in Section 8.3, RBOs should be preparing River Basin Management Plans beginning after 2010. The RBMPs will include water quality improvement as part of the overall management plan because the goal of each RBMP is to achieve good status in all water bodies. Preparing a National Strategy prior to those of the river basins will help support and provide guidance for the RBMPs.

The Central Asian Regional Environment Centre (CAREC) is involved in reviewing water quality standards and many of its staff members have a good understanding of the EUWFD. It would be valuable to involve CAREC in the preparation of the Strategy for the Improvement of Water Quality.

In the development of the Strategy special attention must be given to the role of the private sector, specifically industry, as industry will play a major role and be a major partner in the improvement of water quality. The agricultural community and municipalities also must play a central role.

There will also need to be a strong legal component with amendments and additions to the Water Code, the Environment Code, the Law on Self-Governance, laws pertaining to industry and agriculture, etc. Several ministries, including Ministry of Justice, will need to be involved.

15.7 Rebuild Water Quality Labs in RBOs

The need for water quality labs in RBOs is discussed in Section 8.4 and a cost estimate also presented in Table 18.2. The discussion is not repeated here except to reinforce the need for them. While Kazhydromet, DEP offices and SES offices at the oblast level all monitor water quality in some form or another they do not present a complete picture and the approach to monitoring is not flexible enough to respond to water quality incidents and areas of specific concern. As the manager of water, including its quality, the RBO needs the ability to respond on its own.

There is the possibility of working with the private sector on developing water quality laboratories that RBOs and other organisations can make use of. Indeed, there are already private water quality labs operating in Kazakhstan. This is potentially a good, money saving alternative to building labs in each RBO. However, to attract the private sector, there will initially need to be some sort of guarantee of work for them. In practical terms, this means that RBOs need to have the responsibility for water quality management and the budget to collect samples and have them analysed at the private labs. Consideration needs to be given to the private sector alternative.

15.8 Implementation and Financing

Implementation of the improvement of water quality will be a large scale, long term programme. It will be mainly financed through the republican budget but much of the total costs will be directed at aspects such as capacity building in CWR, RBOs, MEP, etc. which must be done anyway. It is difficult to separate these costs. There is significant potential for projects and programmes for improving water quality through grants and loans from international funding institutions.

The Plan and cost estimate for improving water quality is given in Table 18.8 in Section 18. Many of the elements for the plan for improving water quality have not been costed because studies will need to be carried out before estimations can be made.

16 Improving the Efficiency of Water Use

16.1 Water Use in Kazakhstan

Very low efficiency of water use, especially in irrigation, is one of the biggest problems in Kazakhstan today. It has consequences for wasting water, for a start, but also:

- damage to the Syr Darya delta wetlands because of overuse of water
- 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 groundwater
- increasing losses of cultivable land from salinity
- an important relationship with transboundary issues

Most of the waste in volumetric terms is in irrigation and most of the environmental damage is also due to poor irrigation practice. Overuse of water causes low crop yields, irreparable damage to agricultural land, saline groundwater which is no longer usable, environmental degradation of the rivers and other water bodies downstream as well as health problems among the local population.

Of most important note for planners and financial decision makers is that there are huge and direct costs associated with the poor irrigation efficiency. Annual losses to Kazakhstan due to crop yields alone are estimated at KZT 27 billion ($US 200 million).

As a further example, there is a proposal to build Koksarai Reservoir to capture winter releases from Toktogul in the Kyrgyz Republic to store it for summer use. Koksarai has an estimated capital cost of some $200 million, with a probable annual recurrent cost (for operations and maintenance) on the order of $5 million. Spending just this recurrent cost estimate on a committed programme of irrigation reform and farmer training to improve irrigation efficiency would almost certainly negate the need for Koksarai.

The government has already committed to improving water use efficiency by 20% by 2010. This is now only five years away and considerable work will need to be done to achieve it. Irrigation requires improved coordination and communication between agriculture and water, at the national level and at Oblast and river basin level. There are several methods which are available for improving water use efficiency, but all require the farmers themselves to be trained in order to change their irrigation methods and habits. Without training they will continue to irrigate the way they always have, negating any benefits from works designed to improve efficiency.

Most of the total volume of water savings will be derived from irrigation simply because the vast majority of water consumed is in that subsector. However, there are important savings to be made in industry and in municipal domestic use. In industry this requires opening dialogue between industry and water management authorities to investigate water saving technologies. It will also require a more stringent, transparent and systematic approach to monitoring industrial water use, including in the smaller industry and commercial subsectors.

16.2 Future Water Demands and Resource Protection Needs

In addition to the massive direct costs to the country from poor water use, the future water needs and the future water resources must be carefully considered and planned for. Precise forecasting of the water resources is always difficult, but Kazakhstan can be certain of one thing: there will not be more water available in the future and the resource is likely to be smaller.

At the same time, water demands will certainly grow. Future water demands can only be met through increases in water use efficiency.

A few examples of the importance of water efficiency improvements with regard to water demands are:

- Industrial expansion is likely to be driving a good portion of economic growth in the foreseeable future and will require increased water resources unless accompanied by improvements in water efficiency and reduction in total consumption. Water resources management should not be allowed to be a barrier to industrial development.
- Over the next 10 years there will be increasing water demands in the domestic sub-sector due to the achievement of the MDGs for water supply and sanitation to 2015. The MDGs cover only half the population of those who currently lack sufficient access to water and sanitation. Beyond that, for another 10 or 15 years, the initiatives implied in the President's Vision for 2030 will continue the process of getting water to the people. This implies more people connected to a central system as well as an increased level of service. Per capita consumption will rise as well as the number of people. These new demands need to be met.
- With a change in water management practice to IWRM there will be a greater demand for environmental flows in rivers. These will go significantly beyond flows allocated under the Soviet system and will be a greater demand on the water resources.
- If there is to be expansion of irrigated agriculture there will need to be a coincident reduction in water consumption per unit area.

All of the above also have implications with regard to protection of water resources:

- With an increase in industrial activity there will be a consequent increase in industrial pollution unless legislation is passed and enforced to stop it.
- An issue even now in the urban water supply and sanitation sub-sector is that waste water is disposed of into rivers with either insufficient or no treatment. As the number of people connected to central sewage systems increases, it will be increasingly necessary to ensure proper treatment of waste water prior to disposal.
- Overuse of water for irrigation damages soils and reduces the future potential for agricultural expansion. Improving water use efficiency not only save water, it saves soil.
- Watershed protection needs to be addressed to ensure water is environmentally safe and ecologies healthy. Solid waste management, for example, needs to be given serious consideration as populations grow and increasing prosperity directs Kazakhstan toward a more 'disposable' society.

The above issues are examples of what water resources managers will need to deal with in the short and long term.

16.3 Water Use Efficiency across the Water Sector

Water efficiency improvements can be made in most subsectors of water (industry, domestic, irrigated agriculture, etc.). However, from a water resources point of view the greatest saving are to be had through irrigated agriculture because of its overwhelmingly large share of water consumption.

Table 16.1 shows the water consumed in Kazakhstan by subsector, illustrating the relative impact of emphasising water saving efforts in the irrigation subsector. The Government of Kazakhstan has already made a commitment to improve water use efficiency by 20% by 2010. Although the time is now short, it is a reasonable target.

Table 16.1: Distribution of Water Use by Subsector (2002)

Water Subsector	Annual Consumption	
	(MCM)	(% of Total)
Domestic Water Supply	612.43	4.0
Industry	3685.50	24.4
Agriculture	10717.24	71.0
(component of which is 'regular' irrigation*)	(7100.96)	(61.0)
Fisheries	89.70	0.6
Other Uses and Losses	0.10	0.0
Total	**15104.97**	**100.0**

* not included in total as it is covered under the agriculture heading

Achieving a target efficiency improvement of 20% would result in annual water savings of some 2100 MCM from irrigation, but only 120 MCM from the domestic subsector. This is not to argue that efforts to improve water use efficiency should not be undertaken in the domestic subsector, but it highlights where efforts should be concentrated.

16.4 Coordinate Efforts in Improving Water Use Efficiency

Solving the water efficiency problem must bring together many organisations. At the ministry level, the leader is the Ministry of Agriculture (MoA), both in its agricultural role and as the ministry presently responsible for CWR, with the Ministry of Environmental Protection (MEP) and the Ministry of Industry and Trade (MIT) as other important partners.

In several other sections of this Plan reference has been made to reducing the fragmentation of water management through formalising the relationships between the various ministries and other organisations involved in water. To facilitate at least the beginning of the process of formalisation, a recommendation has been made to extend the work period of the Interministerial Working Group (IMWG) formed for the preparation of this Plan. Coordination between ministries and other organisations is necessary for all aspects of IWRM, and the IMWG will support all of them. However, because of its importance, special attention may need to be made to coordination for improving water use efficiency.

16.5 Transboundary Effects of Water Efficiency Improvements

Kazakhstan has great interest in improving cooperation in transboundary water management because so much of its water resource is generated across international borders and a substantial proportion leaves Kazakhstan. Kazakhstan is rightly concerned about its future water resource security. However, Kazakhstan could improve its water resource by several billion cubic metres per year by improving water use efficiency, which would be highly beneficial in water security.

Water use efficiency is very poor all across Central Asia, especially in the irrigation subsector. Kazakhstan's achievement of a good level of water use efficiency would give them a strong position at the negotiating table for regional cooperation on water management.

At the same time, because the problem is a regional one, solutions could be dealt with regionally too. A cooperative effort on identifying the best methods for improving water use efficiency would help foster regional cooperation on water management which would improve the water resources for all.

CWR and MoA should investigate the possibility for coordinated regional efforts on assessing the way forward in improving water use efficiency. There is good potential for funding of such an initiative from IFIs.

16.6 Water Efficiency for Environment and Ecology

There will be increased water needs for the environment and ecology as Kazakhstan adopts a more environmentally friendly approach to water management and water use. It will be important to have a real understanding of environmental and ecological needs are.

Environmental or ecological flow regimes should be determined for each river and tributary as dictated by the geography and hydrology of the catchment. These should be carried out for each river basin by the RBO. Calculating environmental flows is a complex task requiring many different specialists in ecology, biology, hydrology, etc. The old Soviet standards for 'ecological flow' are out of date and insufficient but as there are essentially no environmental flows now, the first step would be to make it policy to at least release the amount required under the Soviet system while determining more viable environmental and ecological flows for the future.

16.7 Improve WE in the Domestic Subsector

In the domestic subsector there is much scope for improving water use efficiency but the drivers are less related to water resources management and more related to cost effectiveness. Losses in an urban water delivery system are a significant cost burden to the service provider. Reducing these losses also sends the right message to all water users that conservation is necessary. It also may have a very important impact on local water resources in specific basins or sub-basins.

Vodokanal and Vodkhoz, as the service providers, should begin a programme of loss reduction across the country. This will require initial capital outlay on the part of

Central Government through increased operating budgets to the service providers. It is the current government policy of underfunding and underfinancing water supply and sanitation systems combined with the government policy of not allowing sufficient revenues to be generated either at the local administration level or through water tariffs that has led to the current deteriorated state.

Following the initial capital outlay, costs for continued efficiency improvements in the domestic sector should be borne by the water service delivery organisations. These costs must then be recovered through a rational programme of water charges. Several studies have shown that there is an ability to pay for water and even a willingness to pay for it as long as there is an improvement in service. Leakage reductions lead to reduced problems in service interruptions and an improvement in water quality.

If increases in tariffs and collection rates are to finance recurrent costs in water supply and sanitation, the money collected must be available for use by the service provider and not be simply absorbed by the central treasury, as much of it is now. Increasing water charges, enforcing payment and ensuring the money stays within the system will require changes in tax laws and in government policy.

Several foreign funded projects have been completed in recent years on improvements in urban water supply and sanitation systems. Most include plans to reduce leakage rates, recommendations on tariffs, etc. These should be revisited and recommendations made by the Vodokanals and Vodkhoz, through the CWR, to influence government policy.

Improvements in efficiency in the domestic sector can also be made through a public awareness campaign directed at water conservation in the home. Such PA campaigns are relatively inexpensive to plan and implement. They should be combined with greater water education in the schools, as discussed in Section 14.6.

16.8 Improve WE in the Industrial Subsector

In the industrial subsector water savings are generated through treating and recycling of water. In some cases this could be taken as far as an almost closed system, resulting in very little water consumption. Secondly industries can improve water use efficiency through decreasing pollution of the water resource.

Reducing water consumption must be done through rationalised water charges. This will first require a task force to determine what rational water charges should be. Initially, this should be done through a process of dialogue between water service providers, RBOs and representatives of industry. The CWR and the Association of Vodokanals should initiate discussions with industry to set a tariff scale which is acceptable as a first step. Eventually, however, tariff structures for industry and other water users will be done through the River Basin Councils which should be fully functional by 2008 or so.

A parallel step is to improve the quality of monitoring of water consumption by the RBOs. At present there is little real monitoring going on, with planned and actual consumption being suspiciously similar. The CWR should convene a meeting of RBOs to discuss the way forward in improving monitoring. RBO inspectors will have very good ideas on how this may be done. It should be easy to come to an internal

agreement on the next steps. A plan of action should be developed and industries in each RBO informed by the RBO inspectors.

There is a need to increase water use inspector staff in RBOs and an increase in their capacities, requiring additional training so that inspectors actually monitor water use and to increase numbers of staff to accommodate the increased workload. This has been discussed in Section 8.2.

With regard to reducing water pollution as an efficiency measure, international experience has shown that the most effective approach is through a combination of incentives for installing water treatment facilities (usually through tax breaks) and instituting and enforcing the 'polluter pays' principle. The 'polluter pays' principle consists of instituting charges or fines to the industry for discharging pollutants into water bodies at a level which is both discouraging and related to the actual cost of the damage it does.

Implementing polluter pays principle will require a change in government policy and amendments to the Water Code and the upcoming Environment Code, and may need changes to laws governing industry.

16.9 Improve WE in the Irrigated Agriculture Subsector

Irrigated agriculture uses over 70% of the water resources of Kazakhstan and uses it very inefficiently. In fact, Central Asia as a whole, including Kazakhstan has the worst irrigation water efficiencies in the world. Most irrigated crops use between 3 and 7 times as much water as in other countries with similar crops, climates and soil conditions.

Apart from wasting a valuable resource, the inefficient use of water results in an equally inefficient use of public money, furthers the poverty of farmers, damages the environment and causes loss of soil fertility, land degradation and the reduction of available land for agriculture.

There are several reasons for the very poor water use, all of which have to do with governance and management, so the solutions lie there as well.

Mechanisms for increasing efficiency of water use are essentially limited to:

- reversing the deterioration of the irrigation infrastructure
- improving water pricing and tariffs
- changing policy on subsidies and financing
- adopting improved irrigation technology
- instituting farmer education and agricultural extension

These are also interlinked and the most appropriate approach is to combine them in a coordinated effort to improve the efficiency of water use in irrigation.

16.10 Reverse the Deterioration of the Irrigation Infrastructure

The recent programme of devolution of responsibility for the management of irrigation systems from the national level to local administration has not been linked with the devolution of revenue generation to local administration. Local administration cannot

generate sufficient revenues through irrigation tariffs to support the maintenance and operation of the irrigation systems. Therefore irrigation systems have steadily degenerated.

A decision must be made by central government to rehabilitate the irrigation systems so that they are technically able to provide water when and where it is needed. Because of the deteriorated state of the irrigation system full cost recovery from farmers is unfair and probably impossible. The initial cost of rehabilitation should therefore be covered by central government through the local administration offices.

As a first step irrigation service providers (Vodkhoz) in each oblast should carry out a realistic and comprehensive assessment of the current state of the assets. The assessment should also be used to form the basis of an Asset Management System and Plan. The Asset Management System is a tool through which to keep track of the condition of the infrastructure to enable developing and monitoring a long term asset management programme and prioritise spending where it is most needed.

An Asset Management System (AMS) is essentially a piece of software, a data base on which to store information on the condition of infrastructure, plans for improvement, etc., which is updated as rehabilitation and maintenance is carried out. There is good potential for the development of the AMS to be supported through IFI assistance.

16.11 Improve Water Pricing and Tariffs

The continuing view that farmers are too poor to pay for the water that they use for irrigation holds back the rehabilitation and improvement of their irrigation infrastructure to the point where it does not work properly. Most farmers will pay for irrigation service if the service is good, meaning that it delivers the right amount of water at the right time in a way that is both hydraulically and financially efficient, because the cost to farmers is low compared with earnings from agriculture.

The continuation of the current policy of extremely low water tariffs and low collection rates creates a downward spiral of farmers refusing to pay for the service which continues to deteriorate, strengthening farmers' refusal to pay. It is necessary to reverse the trend.

Farmers should not be expected to cover the costs of rehabilitation, but the tariffs should rise over the next few years to a level which will fully support recurrent costs and improvement costs.

Increasing water tariffs must be gradual and directly linked to improved service (meaning the right amount of water, when and where it is needed). Improved service must also lead to better crop yields and financial returns which rely not just on irrigation improvement but improvement across the agricultural sector. This will require increased agricultural extension, training of farmers and other agricultural inputs on the part of the government.

Water tariffs, whether in agriculture, industry or the domestic sector should not be seen as, or applied as, a means of generating revenue. They must be approached as:

1. a means of supporting water services to ensure services are properly, meaning sustainably, funded, able to do their jobs effectively and plan for the future
2. a means of promoting efficiency in water allocation and water use

Therefore the first step in rationalising the tariff structure is for the central government to make a policy decision on changing it. Following the policy decision and analysis is needed on how to reform the tariff structure. A full economic and financial assessment needs to be done on farmer incomes and the impact of irrigation, leading to determining what farmers can reasonably afford for water charges. The assessment must take into account the potential for increased yields which should be derived from reductions in water use through the combined interventions of improved irrigation systems, modern technologies and farmer training.

The assessment should be done as a priority so that Vodkhoz begin to have an income on which they can carry out operations and maintenance as soon as possible.

Note on Policy Changes on Subsidies and Financing

There will likely be need for some agricultural subsidies and these will need to be given careful consideration. There are few, if any, countries in the world which do not subsidise agriculture, and subsidies are usually fairly substantial. There is no reason why Kazakhstan should be any different. However, the subsidies must be strategically placed – 'smart' subsidies aimed at very specific goals and targets. It is generally considered unwise to subsidise water use because it promotes the idea that water is free or cheap and that overusing it is acceptable.

Given the current deteriorated state of the irrigation systems it must be up to government to finance its rehabilitation. This would certainly be classified as a subsidy but it has very specific purposes:

- bringing irrigation systems back to a workable state
- reducing the environmental degradation
- stopping the degradation of soils in agricultural areas and loss of arable land

There must be policy reform in the overall financing of irrigation systems, which will include the reform of water tariff structures as mentioned above. Mainly this means that where the responsibility for irrigation management and maintenance has been devolved to local administrations an equal ability to raise revenues to finance irrigation management and maintenance must also be devolved. This will likely require a change in tax and other financial laws but may only require a change in practice which is already supported by law.

16.12 Improve Farm Application Methods

Modern irrigation technologies

Advanced technology such as drip and sprinkler irrigation can improve water use efficiency but are expensive, difficult to use effectively and are not suitable to conditions of high salinity and high sediment loads, both of which are features of much of Kazakhstan's irrigation areas. Studies have shown that sprinkler and drip irrigation technologies, when improperly used, can waste as much water as furrow

and flood irrigation. While there may be potential for adopting certain new technologies, their impact in Kazakhstan field conditions must be carefully assessed. Several studies have already taken place in Kazakhstan and in other areas of Central Asia which should be revisited to determine if there are new technologies which could be used for the conditions in Kazakhstan. Costs to farmers of taking on the new technologies must also be assessed for feasibility.

Land levelling

Land levelling is seen by many as a good way to reduce water use per hectare and, at least theoretically, it should have an impact. As a government programme it could be expensive but costs may be offset by the resulting reduction in drainage volumes, which in turn will reduce the costs of drainage and disposal of saline water.

Studies into land levelling have been carried out in Uzbekistan through the Scientific Information Centre (SIC) which may be applicable to Kazakhstan. These should be assessed by irrigation specialists to determine if there is potential. Pilot projects should also be carried out in Kazakhstan as a means of showing the value of investing in land levelling, if the initial assessment shows promise. There are probably many areas of Kazakhstan where land levelling will be necessary. The studies should also identify where land levelling will be most effective and estimate costs.

There is good potential for international support in studies and assessments of land levelling and other physical irrigation improvements.

Farmer Training

It is well understood in much of the world of irrigation that farmer training must accompany changes in irrigation method. One illustration is from a study carried out in Jordan on high technology irrigation methods[3] which showed that irrigation methods and application rates improved only when farmer training was included in the process.

Closer to home, in a study on land levelling in the Ferghana Valley in Uzbekistan[4], showed that the volume and rate of irrigation applied to fields was unchanged after land levelling. To spell it out, this means that the land levelling had no impact on its own. The reason is very clear – without training the farmer continues to operate his own irrigation system in the same way he did before land levelling as he knows no reason to change.

The two studies cited above illustrate that technical interventions in irrigations can only have a positive impact if they coincide with farmer training. While it is often considered politically incorrect to state it, the reality that comes to light time and again in irrigation studies is that farmers don't know how to efficiently irrigate.

As part of the UNDP Project assisting the preparation of this IWRM and WE Plan a survey was carried out on 500 farmers in South Kazakhstan and Kyzyl-Orda Oblasts. One area of questioning was how farmers ranked their own water use efficiency. Of the farmers surveyed, 72% claimed they were good or very good irrigators with high

[3] GRID (IPTRID) Issue 16 August, 2000
[4] O'Hara, S. and Hudson, B. The Agricultural Decline in Uzbekistan: A Case Study of Yazyavan Rayon, 2001

water use efficiency. Of these, most said they were good because their father or other family member had trained them.

For professional training only 3% said they had received any, from NGOs or other sources. And when asked if they would like training almost half said they don't need it and another 20% said they don't have time (which amounts to the same thing as not needing it). However, this survey indicates that farmers think they are good irrigators who need no further training. And yet it is also well known that Kazakhstan has the highest water use per crop by a factor of 3 to 7 of anywhere else in the world with similar irrigation conditions.

It is apparent that training is necessary but there may be reluctance on the part of farmers to participate without incentives. Incentives can come in several forms, including connecting training with tariffs, pilot projects which show the value of better irrigation and public awareness campaigns to highlight the value of training and improved irrigating.

Prior to a large scale training initiative, an assessment of the best approach to training, including best practice in irrigation in their areas of Kazakhstan, must be made. Following this, pilot studies should be carried out to field test both the application methods and the training itself.

The training itself should be carried out as quickly as possible, but it will still take several years, as the logistics of training some 250,000 to 300,000 farmers will be difficult.

A simplified look at some numbers in Table 16.2 illustrates the cost and value of farmer training.

Table 16.2: Costs of Water Saving Interventions with Farmer Training

Intervention	Irrigated Area Covered	Unit Cost (KZT)	Total Cost (Million KZT)
Rehabilitation of irrigation areas	2,000,000 ha	260,000 / ha	520,000
Land Levelling	1,300,000 ha	65,000 / ha	84,500
Farmer training	1,300,000 ha		
	1 farmer owns 5 ha	260,000 farms	
	1 trainer can train 10 farmers	26,000 trainings	
	1 training requires 3 days	78,000 training days	
	1 trainer costs 6,500 KZT per day		507

Table 16.2 assumes a total irrigated area of 2.0 million ha, with 1.3 million currently in service. It assumes a cost per ha for total rehabilitation of 260,000 KZT and a cost of land levelling at 65,000 per ha (under the further assumption of government contracts to carry out the levelling). It is also assumed that land levelling would only be carried out on the 1.3 million ha currently in service. The cost of a trainer is assumed at 6500 KZT per day, requiring a total of 507 million KZT.

This is admittedly a rough estimate provided only as an illustration. However, it indicates the orders of magnitude difference between structural and mechanical interventions and farmer training.

Once new irrigation technologies, land levelling and farmer training are assessed and their potential for improvement of water efficiency determined, a full Feasibility Study for Water Efficiency Improvement should be prepared in detail, by Oblast, including costing. Implementation of the results of the feasibility will then follow.

16.13 Implementation and Financing

Implementation of the improvement of water use efficiency will be a large scale, long term programme. It will be mainly financed through the republican budget with much of the total costs directed at rehabilitation of infrastructure, which is absolutely necessary anyway. There is significant potential for early feasibility studies and similar projects, plus farmer training, to be supported through grants and loans from international funding institutions.

The Plan and cost estimate for improving water efficiency is given in Table 18.9 in Section 18. Many of the elements for the plan for improving water use efficiency have not been costed because studies will need to be carried out before even initial cost estimates can be made.

17 IWRM and Cooperation on Transboundary Waters

17.1 Kazakhstan and Transboundary Waters

Regional cooperation on the management of transboundary rivers is of great importance to Kazakhstan because of its position as both a downstream and an upstream riparian. Almost half of Kazakhstan's total water resource is generated in neighbouring countries and a significant proportion flows out to neighbouring countries. The quality of water entering Kazakhstan is generally poor having already been polluted before crossing the border, and Kazakhstan further pollutes these rivers before they cross to other countries. Kazakhstan needs to be concerned both about its vulnerabilities as a downstream riparian and its responsibilities as an upstream riparian.

Over the last decade and more, several initiatives have worked to create multilateral agreements on transboundary waters and to oversee regional cooperation. The main initiatives specific to water are:

- The International Fund for Saving the Aral Sea (IFAS) developed out an earlier Interstate Council for the Aral Sea, created in 1993. Under IFAS the Intergovernmental Sustainable Development Commission ISDC was formed, then the Interstate Commission for Water Coordination (ICWC) with its two RBOs for the Amu and Syr Darya, plus a scientific arm (SIC) to support technical issues. This organisation remains and is the best structure for organising regional cooperation. However, it has weakened in recent years and will need considerable support to make it into a strong regional organisation.
- The 1998 Framework Agreement on the use of the water and energy resources of the Syr Darya. Now seven years old, it has never been implemented because of conflicting interests among the countries and interests appear to be diverging. There are now studies going on to try to improve the Agreement but functional implementation is unlikely in the near future.
- A Water Energy Consortium (WEC) is now being considered under CACO in an attempt to drive progress on agreements in water and energy cooperation. In the CACO meeting in September 2005, a directive was passed to finalise the WEC agreement by 1 December 2005. This is a positive step forward, but merely defines what WEC does. WEC is dominated by energy interests rather than water, but maintains a potentially important body to encourage regional cooperation on water.
- A Chu-Talas Commission, the main component of a long term bi-lateral agreement with Kyrgyzstan on sharing water in the Chu-Talas Basin, has been under development for five years. Authority to set up the Chu-Talas Commission was given in 2000. It has been stalled this past year because of the difficulty in ratification from the Kazakhstan side.
- Several, short term (annual) agreements are made, with Kyrgyzstan, Uzbekistan, Russian and China. The agreements with Russia, while short term, work fairly well because of their simplicity (no serious sharing issues) and because there are several rivers flow both into and out of Russia and Kazakhstan, creating a good atmosphere for international cooperation. The others have not proved very effective and have little impact on water security.

It is difficult to develop and implement functional agreements on water cooperation in a political climate which does not favour cooperation, as seems to be the case in Central Asia at present. However, there are many initiatives supporting increased cooperation in many areas, all of which help to promote a broad attitude of regional cooperation. The two which are most important to water are:

- The Special Programme on the Economies of Central Asia (SPECA) had the original purpose of mobilising funds to solve priority problems, to be a catalyst in strengthening regional cooperation and to provide the decision-making bodies with a neutral forum for discussion of the region's development issues. Several working groups were established, including the Water and Energy Working Group. With the support of UN agencies, SPECA could help to foster stronger regional cooperation.

- The Central Asian Regional Economic Cooperation (CAREC) is an organisation to support economic cooperation among the CA countries and its neighbours, as China, Mongolia and Azerbaijan are also members. CAREC focuses on energy, transport and trade with the main aim of opening up trade within the region and outside it. There is an important water connection because of a large focus on energy and energy markets. But more importantly, CACO has a broader drive for cooperation which may become a foundation on which to build cooperation in water.

Recent moves in several of these organisations and initiatives suggest an improving attitude toward regional cooperation. They are the foundation on which to build stronger regional cooperation in general and, with that, functional cooperation on water management.

17.2 Key Issues in Regional Water Management

The relatively slow progress on cooperation on transboundary waters in Central Asia has many causes, not all of which can be solved within the water sector. A greater regional climate of cooperation is also necessary. Therefore, Kazakhstan must take a broader view of improving regional water management to include improving its own water management as part of the overall process.

There are several hard facts of water management in the region which should form the basis of the regional transboundary strategy:

1. Transboundary agreements will not result in Kazakhstan receiving more water

Kazakhstan must accept that transboundary agreements will not result in receiving more water than it does today. It follows than any increases in water demands must be met with savings made through increases in water use efficiency. Fortunately, the potential for such savings is vast given the currently very poor efficiency of water use, especially in the irrigated agriculture sector.

2. Water security is the main goal

As discussed above, Kazakhstan is highly unlikely to receive more water than it gets now. The important thing is that Kazakhstan must know how much water it will have available and of what quality so that it can minimise risk on investment and

management decisions. This is known as water security. Kazakhstan's negotiations on regional water cooperation should be directed at water security.

3. Multilateral transboundary agreements are likely to be many years away

While it is the case that the climate for regional cooperation appears to be improving, it remains weak. It is also the case that agreements on transboundary water cooperation tend to lag behind broader agreements on trade and other economic areas. Therefore, multilateral agreements, such as the Syr Darya and Amu Darya being managed within a regional framework, are many years away. Kazakhstan can do its part to foster regional cooperation but it must also move forward on its own to improve water management at home.

4. Water quality may be the biggest issue in transboundary waters

Virtually all water entering Kazakhstan is of poor quality. This has significant cost and technical implications as well as environmental and ecological ones. Discussions on transboundary agreements must begin to include, and emphasise, water quality.

5. Each country in the region needs to improve its own management first

Before international agreements can be implemented and effective the water management organisations within the respective countries must be competent and capable. National water management improvement programmes are necessary prior to workable international agreements because they result in the need for technical interventions at the river basin level. This includes Kazakhstan.

6. Kazakhstan will be in a better position to discuss water sharing relations with its neighbours when water is better managed in Kazakhstan

While Kazakhstan complains at the quantity and quality of the water coming across its borders from neighbouring countries, it subsequently wastes and further pollutes that water before it flows into other countries. This puts Kazakhstan into a poor bargaining position which will improve when water is better managed here.

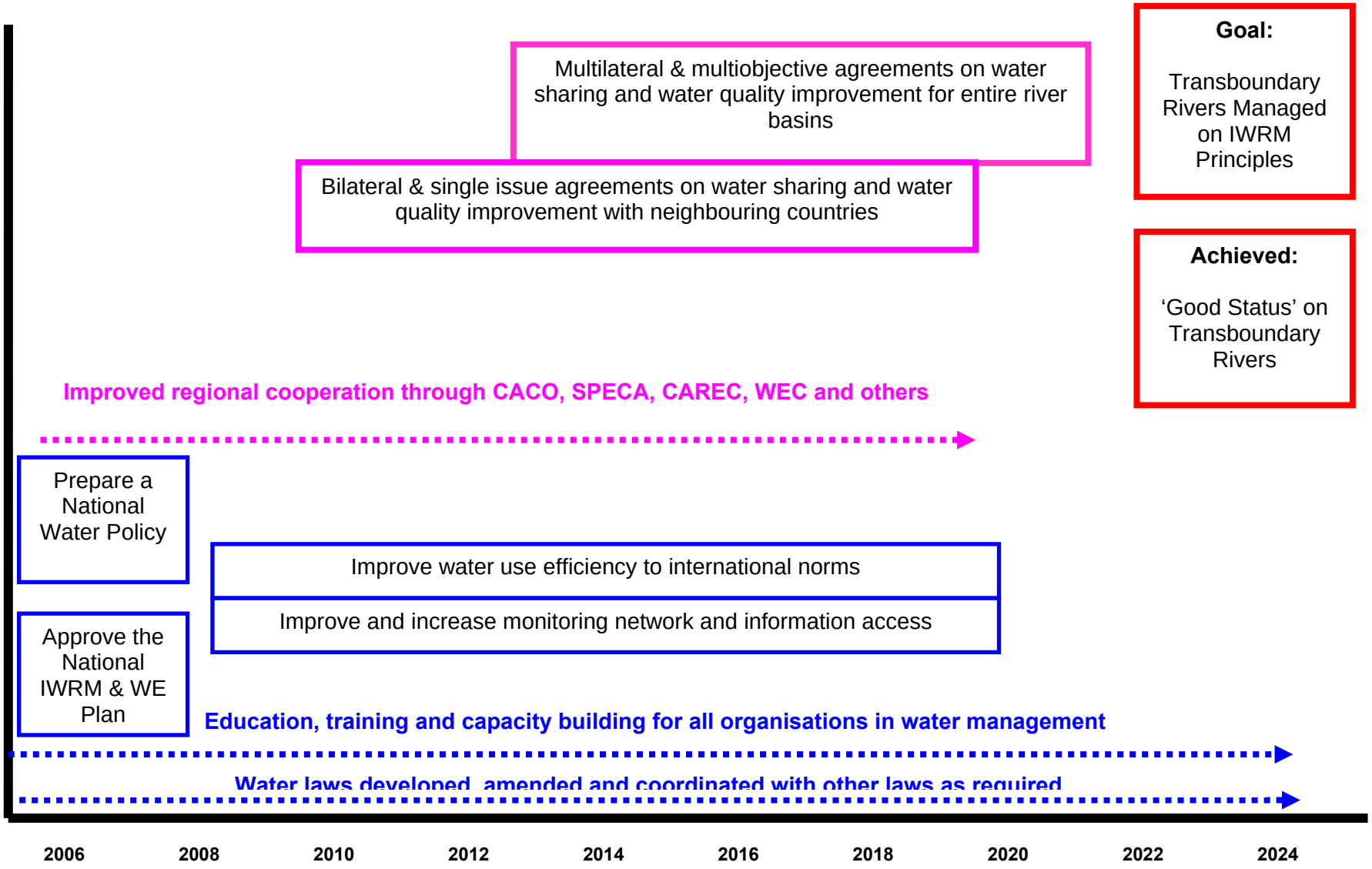
7. Kazakhstan must also live up to its own obligations as an upstream water user

Kazakhstan is also an upstream riparian and has obligations under the Water Convention to ensure water flowing to its downstream neighbour (Russia) are not damaged. Doing so will improve Kazakhstan's position in transboundary negotiations with its upstream neighbours.

17.3 Regional Water Cooperation as a Long Term Goal

Kazakhstan must take a strategic approach to transboundary water cooperation which is based on improving its own water management while working toward regional water cooperation. A progression outlining such a strategy is given in Figure 17.1.

Figure 17.1: Progression from the National IWRM and WE Plan to Transboundary Management of Rivers



The overall goal of transboundary water cooperation across the region is that all the transboundary rivers are managed on an international basis according to the principles of IWRM. Following that, the further goal is to achieve “good status” in all the river basins, which simply means creating healthy rivers through sustainable management.

In general, the approach to achieve those goals is to work toward functional and implementable regional agreements while developing sound water management within Kazakhstan. Virtually all the boxes in Figure 17.1 have been previously discussed as other components of the National IWRM and WE Plan. Most of the work to achieve good regional water management of the rivers is done at home.

17.4 Finalise and Approve the National IWRM & WE Plan

As discussed in Section 5.1, this is the important first step to ensure that actions are taken toward improving water management in Kazakhstan as an essential component of achieving regional cooperation on water management.

When IWRM becomes an accepted management practice across the region, cooperation on the transboundary will follow. This is because by definition IWRM requires managing rivers on the basin principle. Kazakhstan is now leading he region in the development of IWRM. Failure to approve and adopt this National IWRM and WE Plan will remove that leadership from Kazakhstan.

17.5 Prepare and Approve a National Water Policy

A National Water Policy is proposed in Section 5.2. It is a policy of the Government, not of a specific ministry or department, and ensures that the Government is committed to and involved in managing the water resources of Kazakhstan. The National Water Policy also references regional water management and its commitment to it.

17.6 Strengthen the Legal Base and Build Capacity in International Law

Section 6.5 discusses the need to improve the legal base by ensuring that laws do not conflict with each other, especially where new laws such as the Water Code and the Environment Code are concerned. It is already known that some of Kazakhstan’s laws and regulations hinder or even preclude implementing international agreements on water cooperation. The failure to ratify the Chu-Talas Commission is a case in point. It is necessary for the CWR to work with Ministry of Justice and others to identify problems in law and make improvements where necessary.

It is also necessary to build capacity in international law through sending students abroad to study and bring home this knowledge and experience. This is discussed in Section 14.4.

17.7 Improve the Status of CWR and RBOs

As discussed in Section 6.1, Kazakhstan’s dependence on transboundary water resources requires it to be in a strong position in international negotiations. Most of

Kazakhstan's neighbours have maintained the former Soviet structure of a Ministry of Water Resources which Kazakhstan discarded after independence. Therefore Kazakhstan is represented at a lower government level than the other countries at the negotiating table leaving it with a serious disadvantage with respect to diplomatic protocol, as the chairman of the CWR must refer to his Minister of Agriculture and Minister of Foreign Affairs on all decisions.

A few options for improving the status of CWR are given in Section 6.1, but the best are:

- the creation of an Agency for Water Management, which would give the head (chairman or director) the ability to represent the Prime Minister
- the creation of a Ministry for Water Resources

As water management develops and improves, the authority of the RBOs will need to increase. On transboundary rivers the Directors of RBOs need to have a high enough status to properly represent their basins at transboundary discussions with other countries. Their status also needs to be raised.

17.8 Improve the Capacity of CWR and RBOs

Sections 7 and 8 of this National IWRM and WE Plan present the arguments and plan for building capacity in CWR and RBOs. Their present weak condition is inadequate to effectively manage water and must be strengthened as water management increases in complexity and takes on a larger international dimension.

Section 9 discusses the River Basin Councils (RBCs) which are the representatives of water stakeholders in the river basin. RBCs will play an increasing role as advisers in water management and this will include transboundary issues on those rivers.

17.9 Improve Monitoring and Information Management

Kazakhstan is in the dark on many transboundary issues because the managers and decision makers have little information on which to base decisions or on which to base arguments and agreements in discussions with their transboundary neighbours.

Several sections of the Plan deal with the need to improve monitoring and information: Section 7.4 on information in CWR, 8.5 on information in RBOs, Section 10 on surface water monitoring, Section 11 on groundwater monitoring, Section 15 on water quality and, especially, Section 13 specifically on information management. All of these have implications for transboundary water.

Kazakhstan should also join UNGEMS, which is an international information oriented programme for sharing environmental data, including water. China belongs to UNGEMS and so would be obliged to share data with Kazakhstan as an equal member. This would be very valuable for Kazakhstan in its negotiations on the Ili and Irtysh Rivers.

17.10 Improve the Efficiency of Water Use

Improving efficiency of water use, especially in irrigation because of the massive waste, is absolutely essential for the future of Kazakhstan's water resources and economy. But it also impacts on transboundary waters. First, reducing the waste of water reduces Kazakhstan's reliance on transboundary water. Second, once Kazakhstan has taken steps to improve water use it can use this as a bargaining tool in transboundary negotiations. Section 15 presents a large scale programme for improving water use efficiency which should be detailed, approved and implemented.

17.11 Meet the Requirements of International Conventions

There are several international conventions and protocols to which Kazakhstan is a signatory but is not yet living up to their terms. These include the 1999 Protocol on Water and Health and the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes (the Water Convention). Kazakhstan must develop a programme to meet the requirements of these conventions because Kazakhstan has agreed to do so and has the obligation now to take action. Another strong reason is to strengthen Kazakhstan's negotiating position on transboundary water cooperation. If Kazakhstan is not living up to its obligations, why should its neighbours?

17.12 Improve the Development of Bilateral Water Agreements

There are already several water sharing agreements in place between Kazakhstan and Russia, but they are generally weak and of short term. Longer term agreements are necessary for water security, so that Kazakhstan can plan its water resources management and economic development with confidence. The existing agreements also do not cover water quality and efforts must be made toward including it.

Developing bilateral agreements may pave the way for future multilateral agreements and provide a learning tool to support them. Bilateral agreements generally focus on one or a few specific problems where agreements may be made fairly easily. These will help to foster an atmosphere of cooperation before embarking on major agreements.

In its work on improving transboundary water agreements, CWR should emphasise longer term, more comprehensive agreements which include water quality – as does the Water Convention. Initial priority may be given to negotiations with Russia because it is also a signatory to the Water Convention and the negotiating atmosphere is good.

17.13 Support the Development of Regional, Multilateral Agreements

As the most downstream riparian in the Central Asian Region, Kazakhstan should take the leading role in developing and strengthening regional cooperation on water. The collective benefits of pursuing cooperative solutions to regional problems must be demonstrated. Kazakhstan could take a lead in this by having CWR prepare a study on the benefits of regional water cooperation. Some work has already been done on this by international organisations and CWR could start with these. Kazakhstan should continue to support and engage with regional institutions involved

with water and environment and strengthen their activity within them. Kazakhstan should also actively participate in regional organisations looking at cooperation in other spheres and sectors of the economy. Non-government organisations should also be encouraged to participate in transboundary initiatives, including research organisations, academic institutions, environmental organisations, etc., to engage with similar organisations from other countries of the region on issues of mutual interest. This Plan has identified several areas where national programmes on establishing IWRM could be carried out cooperatively within the Central Asia Region to help develop a cooperative spirit on water. These include water efficiency improvements, instituting effective water quality management, improving the monitoring network, etc.

17.14 Implementation and Financing

The initiative to improve and further transboundary water cooperation is an ongoing and very long term programme. Much of the specifically regional activity will be financed through the republican budget. However, regional cooperation in general is well supported by the IFIs and there is great potential for studies, meetings and other forms of support to be supported by international agencies.

The Plan and cost estimate for improving regional water cooperation is given in Table 18.10 in Section 18. The costs of most of the elements for the plan for improving regional water cooperation have been included in those tables referencing other sections of the report because much of the work is done on a national level.

18 Schedule and Cost Tables

This Section contains tables of activities, schedules, costs and probable sources of funds for the more descriptive sections provided above and follow the same order as the sections above. The following list provides table numbers, titles and page numbers for each of the schedule and cost estimates.

All the tables presented here are initial estimates and will need clarification by the various organisations which will be applying for budget, looking for financial international assistance, etc. They are intended as a guideline only.

In Column 7 of the tables, Source of Financing, there are frequent references to 'IFIs', the abbreviation for International Funding Institutions. This description covers all potential foreign donors who may be interested in financing specific aspects of the implementation of the National IWRM and WE Plan. Specific would requests would have to be made on an individual basis to attract such investments. It should also be noted that the IFIs are likely to have a greater interest in contributing funds if the project is under the umbrella of implementing this National IWRM and WE Plan.

Table 18.11 presents a more graphical version with compared schedules and cost totals.

Table 18.1: Plan and Estimated Costs for Improving Overall Governance in IWRM

№	Activities	Measurement of result	Responsible for implementation	Period of implementation	Estimated Cost million KZT	Source of financing
1	2	3	4	5	6	7
1. Finalise and Adopt the National IWRM and WE Plan						
5.1	Submit IWRM Plan to government for approval	IWRM Plan Approved and Adopted	CWR	First quarter of 2006	2.0	Republican budget
5.1	Present the National Plan at the IVth World Water Forum	Presentation at WWF IV	CWR	First quarter of 2006	2.0	Republican budget (IFIs)
5.1	Approve and adopt National IWRM and WE Plan	Approved Plan	CG	Middle of 2006	0.0	Republican budget
5.2	Prepare a National Water Policy	Policy adopted	CWR, CG	2006	10.0	Republican budget (IFIs)
5.3	Invite CWR as a member to Committee for Sustainable Development	CWR on CSD	CG	2006	0.0	Republican budget
5.4	Ensure sufficient financing for water management	New budget approvals for water	Central Government	2006	Not calculated	Republican budget (IFIs)
2. Increase the Authority of CWR						
6.1	Continue Interministerial Working Group (IMWG) on status of CWR	Functional meetings of IMWG	Central government	First quarter 2006	1.0	Republican budget
6.1	Assess options and select best option for future CWR status	Options identified and prioritise	Central government	2006	1.0	Republican budget
6.1	Create a new State Agency for Water Resources or a Ministry for Water Resources	New status confirmed	Central government	2007 – first quarter 2008	Not calculated	Republican budget
				Total	16.0 ++	

Table 18.1 (continued): Plan and Estimated Costs for Improving Overall Governance in IWRM

№	Activities	Measurement of result	Responsible for implementation	Period of implementation	Estimated Cost Million KZT	Source of financing
1	2	3	4	5	6	7
3. Increase the Authority of RBOs and support RBCs						
6.2	IMWG to consider RBO status		Central government	2006	2.0	Republican budget
6.2	Establish RBO as the authority for river basin		Central government	2007 – middle of 2008	0.0	Republican budget
6.2	IMWG to consider RBC status		Central government and CWR	2006	2.0	Republican budget
6.3	Establish RBCs and provide support for development		Central government and CWR	2006 – 2010 <	10.0	Republican budget
6.4	Decrease Fragmentation in Water Management Functions		Central government, CWR	2006	0.0	Republican budget
6.4	IMWG to develop plan for decreasing fragmentation		CWR	2006	2.0	Republican budget
				Total	16.0	
6. Coordinate the legal foundation in water and environment						
6.5	Ministry of Justice assign staff to coordinate laws and codes		Central government	Third quarter 2006	4.0	Republican budget
6.5	Assign legal staff for coordination		Central government	Third quarter 2006	4.0	Republican budget
6.5	Assess legal conflicts		Central government and CWR	2006-2007	4.0	Republican budget
				Total	12.0	

Table 18.1 (continued): Plan and Estimated Costs for Improving Overall Governance in IWRM

№	Activities	Measurement of result	Responsible for implementation	Period of implementation	Estimated Cost Million KZT	Source of financing
1	2	3	4	5	6	7
7. Rationalise water management financing and salaries of public officials						
6.6	Rationalise public sector salaries		Central government	2006-2010<	Unknown	Republican budget
6.7	Rationalise financing for water management		Central government	2006-2010<	Unknown	Republican budget
				Total	**Unknown**	

Table 18.2: Plan and Estimated Costs for Rebuilding Capacity in CWR, RBOs and Establishing RBCs

№	Activities	Measurement of result	Responsible for implementation	Period of implementation	Estimated Cost million KZT	Source of financing
1	2	3	4	5	6	7
Rebuilding capacity in the Committee for Water Resources						
7.2	**Apply to increase staff and budget for CWR**		CWR	Through the 2006-2010	45	Republican budget
7.2	**Establish the National Water Information Centre**		Central government CWR	Middle of 2006	30	Republican budget (IFIs)
				Total	75	
Rebuilding capacity in the River Basin Organisations (RBOs)						
8.1	**Increase staffing and budgets in RBOs**		Central government CWR	2006-2010<	500	Republican budget
8.2	Apply for budget for RBO staff increases		RBO CWR	2006-2010<	1	Republican budget
8.3	**Introduce Planning into RBOs**		RBO CWR	2006-2010<	0	Republican budget
8.3	Replace Annual Reports with RB IWRM and WE Plans		RBO CWR	2006-first quarter 2007	100	Republican budget
8.3	Complete Schemes for CUPWR in all basins		RBO, CWR	2006-**2010**	1000	Republican budget
8.3	Complete EUWFD RBM Plans in all basins		RBO	2010 - <	3000	Republican budget
8.4	**Specify water quality management function in RBOs**		CG, CWR	2006	0	Republican budget
8.4	Amend Water Code for the wq management function in RBOs		CG, CWR	First three quarters 2006	2	Republican budget
8.4	Include RBO wq responsibility in the Environment Code		CG, CWR, CEP	Middle of 2006	4	Republican budget

Table 18.2 (continued): Plan and Estimated Costs for Rebuilding Capacity in CWR, RBOs and Establishing RBCs

№	Activities	Measurement of result	Responsible for implementation	Period of implementation	Estimated Cost million KZT	Source of financing
1	2	3	4	5	6	7
8.4	Carry out feasibility study on WQ labs in RBOs		CWR, RBO	Mid 2006-mid 2007	150	Republican budget
8.4	Develop WQ labs as per feasibility report		RBO, CWR	Mid 2007-2009	1000	Republican budget
8.4	Develop a Strategy for the Improvement of Water Quality (each RBO)		RBO	2006-2010	500	Republican budget
8.4	Carry out an RBO Information Capacity Building Project		RBO, CWR	Mid 2006-mid 2007	500	Republican budget
				Total	6757	
Establish and Develop Eight River Basin Councils (RBCs)						
9.2	Establish remaining six RBCs	Eight RBCs Established	CWR, RBO	**2006**	16	Republican budget, local budget, IFIs
8.4	Support and finance operations of RBCs	Eight RBCs functional	RBO, CWR	**2006-2010**	100	Republican budget, local budget, IFIs
8.4	Assess and amend legal base as necessary	Coordinated laws	CG, CWR, MoJ	**2006-2010**	20	Republican budget
8.4	Determine how to ensure stakeholder participation	Improved stakeholder participation on RBCs	RBO, CWR	**2006**	20	Republican budget
				Total	156	

Table 18.3: Plan and Estimated Costs for Surface Water Monitoring in IWRM

Sect. No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
1. Improvement of Regulatory and Legal Framework						
1.1	Prepare legal and regulatory documents	GoK Decree	MEP,CWR	2007-2009	34	Republican budget
1.2	Prepare & improve normative documents	GoK Decree Orders, instructions and notifications	MEP, CWR , MA, MH, MEMR, MES, GOSS	2007-2010	44	Republican budget
				Total	78	
2. Development and Re-equipment of the Monitoring Network, including Laboratories						
2.1	Assess equipment needs	Reports to the GoK	MEP, CWR , RSE "Kazhydromet"	2007-2009	100	Republican budget
2.2	Implement rebuilding of network	Reports to the GoK	MEP	2007-2010	6020	Republican budget
2.3	Maintain existing network	Reports to the GoK	MEP	2007-2010	139	Republican budget
2.4	Procure and establish new equipment	Reports to the GoK	MEP	2007-2010	8383	Republican budget
				Total	14642	

Table 18.3 (continued): Plan and Estimated Costs for Surface Water Monitoring in IWRM

Sect. No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
3. Organization and Development of Monitoring Network at River Basin Level						
1	2	3	4	5	6	7
3.1	Develop and approve programs at basin level	Reports to the GoK	MEP, CWR	2007-2010	26	Republican budget
3.2	Operations on monitoring at river basin level	Reports to the GoK	MEP, TDs EP, CWR, RBOs	2009-2010	155	Republican, Local and user budgets
				Total	181	
4. Development of Information Technology and Communications Systems						
4.1	Establish a unified information system	Reports to the GoK	MEP, CWR	2007-2010	300	Republican budget
4.2	Develop and establish procedures for information access	GoK Decree	MEP, CWR	2007-2008	18	Republican budget
4.3	Procure software	Reports to the GoK	MEP, CWR	2008-2009	300	Republican budget
				Total	618	

Table 18.3 (continued): Plan and Estimated Costs for Surface Water Monitoring in IWRM

Sect. No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
5. Improvement of Research and Methodology						
5.1	Organize research for principles and methodologies	Information to GoK	MEP, CWR	2007-2010	90	Republican budget
5.2	Design and introduce methodological documents	Information to GoK	MEP	2008-2010	65	Republican budget
5.3	Improve regulatory and methodological documents	Information to GoK	MEP, CWR	2008-2010	120	Republican budget
5.4	Develop methodologies for assessments in river basins	Information to GoK	MEP, CWR	2007-2009	45	Republican budget
5.5	Assessment of Balkash lake	Information to GoK	MEP, CWR	2007-2008	19	Republican budget
5.6	Determination of Ili and Irtysh Rivers water use	Information to GoK	MEP, CWR	2007-2008	19	Republican budget
5.7	Assessment of multi-year resources	Information to GoK	MEP, CWR	2007-2010	78	Republican budget
5.8	Development of method for water forecasting	Information to GoK	MEP, CWR	2007-2009	30	Republican budget
5.9	Assessment of Caspian Sea water levels	Information to GoK	MEP	2008-2009	15	Republican budget
5.10	Design standards for hydrological characteristics	Information to GoK	MEP, CWR	2008	6	Republican budget
				Total	487	

Table 18.3 (continued): Plan and Estimated Costs for Surface Water Monitoring in IWRM

Sect. No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
6. Strengthening of International Cooperation in Monitoring of Transboundary Waters						
6.1	Implement Kazakhstan's commitments on international conventions	Implementation Programs	MEP, CWR	2007-2010	65	Republican budget, International grants
6.2	Participate in WMO programs	Report to GoK	MEP	2007-2010	-	International grants
6.3	Participate in donor activities	Programs on Cooperation, report to GoK	MEP, CWR	2007-2010	-	International grants
				Total	65	

Table 18.3 (continued): Plan and Estimated Costs for Surface Water Monitoring in IWRM

Sect. No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
7. Training of Staff in Ecology and Water Resources Monitoring						
7.1	Establish educational data base	Information for agencies concerned	MEP, CWR	2007	6	Republican budget
7.2	Develop exchange programs	Program, report to GoK	MEP, CWR	2007-2008	9	Republican budget
7.3	Establish practical training centres	Information for agencies concerned	MEP, CWR	2007-2010	130	Republican budget
7.4	Train staff, technicians, managers in IWRM	Report to GoK	MEP	2007-2010	36	Republican budget
7.5	Establish library	Information for agencies concerned	CWR	2008-2009	15	Republican budget
7.6	Issue information digests	Information for agencies concerned	CWR	2007-2010	34	Republican budget
7.7	Establish computerized library in CWR	Information for agencies concerned	CWR	2007-2008	27	Republican budget
				Total	257	

Table 18.4: Plan and Estimated Costs for Improvement of Groundwater Management and Monitoring

No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
11	2	3	4	5	6	7
1. Improvement of coordination between water management organisations						
11.2	Ministerial order for greater coordination between authorised bodies in water management	Improved water management	MoA, MEP, MENR, MoH	2006	1.0	Republican budget
11.2	Responsible committees develop method of improved communication, information access and coordination at all levels	Improved water management	CWR, CGSS, CEP, MoH	2006-2007	1.0	Republican budget
			Total		2.0	
2. Improvement of the SSWM Information Base						
11.4	Produce new mapping for aquifer boundaries	New mapping	MEMR (CGSS)	2007	5.0	Republican budget
11.4	Prepare hydrogeological maps of river basins	River Basin groundwater maps	MEMR (CGSS)	2007-2012	70.0	Republican budget
11.4	Assessment of groundwater resource	Full understanding of water resource	MEMR (CGSS)	2012-2014	45.0	Republican budget
			Total		120.0	

Table 18.4 (continued): Plan and Estimated Costs for Improvement of Groundwater Management and Monitoring

No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
3. SSWM Management System Improvement						
11.4	Establish the system of access of and request for information by other interested organisations	System approved by concerned organizations	MEMR (CGSS)	2006	1.0	Republican budget
11.4	Update manuals on monitoring and information	MoJ registered Manuals	MEMR (CGSS)	2007-2008	6.0	Republican budget
11.4	Prepare regulations for various programmes and procedures	Regulations and procedures established	MEMR (CGSS), CWR	2007	2.0	Republican budget
11.4	Prepare procedures for access to surface water and climate data required for groundwater assessment	Procedure established	MEMR (CGSS), MEP	2007-2008	5.0	Republican budget
11.4	Coordinate laws and regulations on groundwater monitoring and assessment	Approval of the Regulation	MEMR (CGSS), MEP, MIT	2007	2.0	Republican budget
11.4	Develop and approve Control Procedures for Oblast inspections	Procedure (Regulation)	MEMR (CGSS)	2007	2.0	Republican budget
11.4	Create offices for SSWM in Oblasts	Offices created	MEMR (CGSS)	2007-2009	20.0	Republican budget
11.4	Establish SSWM Unit for each Oblast (28 new staff members)	Approval of Staff Schedule by MEMR	MEMR (CGSS)	2008 and on	Annually 22.0	Republican budget
			Total		38.0	
			Plus Annual		22.0	

Table 18.4 (continued): Plan and Estimated Costs for Improvement of Groundwater Management and Monitoring

No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
4. Improvement of SSWM Observation Network						
11.5	Optimise monitoring network for improved water resources management	Optimal observation network	MEMR (CGSS)	2008-2025	376.0	Republican budget
11.5	Develop test sites	Test sites established	MEMR (CGSS)	2011-2025	158.0	Republican budget
11.5	Increase access to satellite and other information	Improved information base	MEMR (CGSS)	2008-2025	36.0 Plus Annual 2.0	Republican budget
11.5	Improve technology of monitoring network hardware	Modern system of monitoring	MEMR (CGSS)	2007-2025	6.0 Plus Annual 4.0	
			Total		576.0	
			Plus Annual		6.0	

Table 18.4 (continued): Plan and Estimated Costs for Improvement of Groundwater Management and Monitoring

No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
5. Improvement of SSWM Assessment and Information Capability						
11.6	Increase staff in the SSWM Unit of the Republican Information - Analytical Centre of MEMR (CGSS) (6 experts)	Increased capacity	MEMR (CGSS)	2008	Annually 8.0	Republican budget
11.6	Establish GIS SSWM in river basins	Improved IS	MEMR (CGSS)	2010-2013	23.0	Republican budget
11.6	Assess groundwater reserves and develop risk assessment criteria	Improved information	MEMR (CGSS)	2013-2016	35.0	Republican budget
11.6	Identify specific aquifers and develop mathematical models for assessment of groundwater	Improved information	MEMR (CGSS)	2007-2008	6.0	Republican budget
11.6	Prepare documentation for coordination of format of 2TP-Vodhoz and IS CWR	Approved formats	MEMR (CGSS)	2007	2.0	Republican budget
11.6	Develop IS IASPV Improvement Program for the purpose of IWRM	Program	MEMR (CGSS)	2007	2.0	Republican budget
			Total		68.0	
			Plus Annual		8.0	
6. Improvement of SSWM Forecast System						
11.6	Establish APOMs of aquifers	Improved information	MEMR (CGSS)	2008-2015	51.0	Republican budget

Table 18.5: Plan and Estimated Costs for Improvement of Land Resources Management and Monitoring

№	Activities	Measurement of result	Responsible for implementation	Period of implementation	Estimated Cost million KZT	Source of financing
1	2	3	4	5	6	7
1. Improving the legislative and regulatory base						
12.2	Conduct a study on legal reforms and regulation developments	Information on legal and regulatory Improvements	ALRM	2006-2007	26	Republican budget (IFIs)
12.2	Amend legislation on land management	Improved legal base	ALRM, MoJ	2006-2007	8	Republican budget
12.3	Develop rules for conducting monitoring of land resources, use and pollution	Improved regulations	Central government ALRM, MIT	2006-2007	12	Republican budget
				Total	46	
2. Improve the monitoring network and system						
12.4	Conduct a study to establish monitoring standards	Information on standards	ALRM	2007	60	Republican budget (IFIs)
12.4	Establish national, regional and oblast land monitoring and management centres	Land management centres established in 14 oblasts, plus at national level	Central government ALRM	2007-2012	600	Republican budget (IFIs)
12.5	Improve coordination between ALRM and CWR (national) and RBO (river basin) and CEP	Official coordination and linkage between ALRM, CWR, RBOs	Central government ALRM, CWR, RBOs, CEP	2007-2009	15	Republican budget
12.5	Improve and modernise land monitoring system	Modern land monitoring network established	ALRM, CEP	2007-2012	1000	Republican budget (IFIs)
12.5	Establish ecological observation stations	200 monitoring stations established	ALRM	2007-2010	2000	Republican budget (IFIs)
12.5	Establish special monitoring	Special monitoring	ALRM	2007-2010	100	Republican budget

№	Activities	Measurement of result	Responsible for implementation	Period of implementation	Estimated Cost million KZT	Source of financing
	stations in areas of concern	zones established				(IFIs)
12.5	Procure mobile laboratories	16 labs procured	ALRM	**2007**	300	Republican budget (IFIs)
				Total	4075	

Table 18.6: Plan and Estimated Costs for Improvement of Information Management

№	Activities	Measurement of result	Responsible for implementation	Period of implementation	Estimated Cost million KZT	Source of financing
1	2	3	4	5	6	7
1. Build Information Capacity in Water Management Organisations						
13.3	Assessment of needs and recommendations for information technology and training	Recommendations	CWR, RBOs, ME&S, MEP	2007 – 2008	20	Republican budget (IFIs)
13.3	Procure computer equipment and GPS for CWR and RBOs	Procurement of equipment complete	CWR	2007 – 2010 Plus annual additions	29	Republican budget (IFIs)
13.3	Procure data base software (based on GIS technologies)	Software identified and procured	CWR	2007 – 2010	16	Republican budget (IFIs)
13.3	Train CWR and RBO staff in information management	Trained staff in CWR and all RBOs	MEP, CWR, RBOs, Kazhydromet	2007 – 2010 Plus annual additions	23	Republican budget (IFIs)
				Total	**88**	
2. Identify Information Needs for Water Management						
13.4	Identify needs for information for river basin management and operation of UIS	Monitoring Programs at river basin level	MEP, CWR, RBOs	2007 – 2008	20	Republican budget (IFIs)
				Total	**20**	

Table 18.6 (continued): Plan and Estimated Costs for Improvement of Information Management

№	Activities	Measurement of result	Responsible for implementation	Period of implementation	Estimated Cost million KZT	Source of financing
1	2	3	4	5	6	7
3. Improve Interaction and Coordination for Information Management						
13.5	Develop procedures for access and exchange of information	Agreements on exchange of information	MEP, CWR	2007	15	Republican budget
13.5	Prepare agreements between organisations for information sharing and exchange	Agreements on exchange of information	MEP, CWR	2008 – 2009	15	Republican budget
13.5	Develop orders and procedures for access to information	Decree of GoK	MEP, CWR	2007	10	Republican budget
13.5	Legalise functions of CWR and RBO for information exchange	Decree of GoK	Central Government, MoJ	2006-2007	4	Republican budget
				Total	**44**	
4. Establish the Base for Information Infrastructure in Water Management						
13.6	Establish information departments in CWR and RBO	Information Departments established	Central Government, CWR, RBOs	2007 – 2008	120	Republican budget
13.6	Establish the National Water Information Centre	NWIC established and functional	Central Government, CWR	2007 – 2008	60	Republican budget (IFIs)
13.6	Authorize CWR and RBOs to establish the Unified Information System (UIS) of river basins	Decree of GoK	MEP, CWR	2007	0	
13.6	To work out informative portal and website for CWR as a basis for UIS	Portal	CWR	2007 – 2008	15	Republican budget (IFIs)
13.6	Establish an electronic library on the CWR website	Information for organizations concerned	CWR	2007-2009	55 Plus annual costs	Republican budget (IFIs)
				Total	**250**	

Table 18.6 (continued): Plan and Estimated Costs for Improvement of Information Management

№	Activities	Measurement of result	Responsible for implementation	Period of implementation	Estimated Cost million KZT	Source of financing
1	2	3	4	5	6	7
5. Establish and Operate Unified Information System in the River Basins						
13.7	Design norms and methodologies for operating the UIS	Guidelines for development and operation of UIS	RBOs, CWR, others	2007	15	Republican budget
13.7	Develop the concept the UIS for river basins	Concept detailed	RBOs, CWR, others	2007 – 2008	45	Republican budget
13.7	Design GIS database for UIS	Preliminary GIS	CWR, RBOs, Kazhydromet	2007 – 2008	85	Republican budget
13.7	Clarify river basin boundaries for UIS	River basin boundaries established	CWR, RBOs, Kazhydromet	2007	25	Republican budget (IFIs)
5.5	Conduct inventory of water users and objects	Water user survey completed	CWR, RBOs, MEP, Kazhydromet	2007 – 2010	120	Republican budget Local budget
13.7	Conduct inventory of water management systems and hydraulic structures	Water infrastructure survey completed	CWR, RBOs, MEP, ME&S	2007 – 2010	140	Republican budget Local budget
13.7	Establish electronic data base of water resources	Initial GIS Base developed	CWR, MEP, Kazhydromet	2007 – 2009	95	Republican budget
13.7	Develop GIS water use data base	GIS Base established	MEP, CWR	2007 – 2009	110	Republican budget
				Total	**635**	

Table 18.7: Plan and Estimated Costs for Improvement of Education and Public Awareness

No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
1. Educate Specialists Abroad						
14.4	Develop a programme of foreign education	Programme for foreign education	CWR, MEP, MoJ, ME&S	2006	15	Republican budget (IFIs)
14.4	Send a minimum of 10 students per year abroad	Increasing water specialists	CWR, MEP, MoJ ME&S	2007-2017	300	Republican budget (IFIs)
				Total	**315**	
2. Improve Higher Education in Water Management						
14.5	Appoint education specialists into water management organisations	Education specialists appointed	CWR, MEP, ME&S	2007	4	Republican budget
14.5	Appoint a team of educators for system assessment	Assessment of wm education	ME&S, CWR, MEP	2006	0	
14.5	Team prepares a review of current situation	Assessment of wm education	CWR, Education Study Team	2006	2	
14.5	Study tour of EU universities	Development of education strategy	Education Study Team	2007	8	Republican budget (IFIs)
14.5	Prepare a Strategy for improving wm education	Education Strategy prepared	Education Study Team	2007	5	Republican budget (IFIs)
14.5	Present Strategy to ME&S for approval	Education Strategy approved	Education Study Team, ME&S	2007-2008	0	
14.5	Prepare an assessment and report on study materials	Study materials identified	Education Study Team, ME&S	2008-2009	4	Republican budget
				Total	**19**	

Table 18.7 (continued): Plan and Estimated Costs for Improvement of Education and Public Awareness

No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
3. Introduce Water and Environmental Education into Primary and **Secondary Schools**						
14.6	Endorse CAREC Environmental Textbook for primary schools	Water and environmental issues introduced to schools	ME&S	2006-2007	15	Republican budget (IFIs)
14.5	Develop a pilot project for training teachers in water and environmental issues	Pilot project developed	ME&S	2007	15	Republican budget (IFIs)
14.5	Carry out pilot project and report on application	Pilot project completed	ME&S	2008	50	Republican budget (IFIs)
14.5	Expand teacher training in environment based on lessons from the pilot project	First Phase teacher training completed	ME&S	2008-2012	500	Republican budget (IFIs)
14.5	Increase access to computers and internet	Improved access to good learning tools	ME&S	2007-2010	1000	
				Total	**1580**	
4. Increase Public Awareness in Water Issues						
14.6	Develop RBO and CWR Information Departments considering Public Awareness	Information departments responsive to PA needs	CWR, RBOs	2006-2007	0 (accounted for in Table 18.2)	
14.5	Strengthen CWR PR department into a complete PA department	PA department improved	CWR	2006-2007	0	
14.5	Develop the Unified Information System	UIS completed	CWR	2007-2010	0 (accounted for in Table 18.6)	

14.5	Prepare and present short courses on water management issues for government personnel	Courses in water management completed	CWR, MEP, IMWG	2006-2008 (and beyond)	10	Republican budget (IFIs)
				Total	**10**	

Table 18.8: Plan and Estimated Costs for Instituting the Management of Water Quality

No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
1. Formalise Responsibility for Water Quality Management						
15.2	IWMG to decide on responsibility for WQ management and recommend to government	Decision for RBO to be WQ manager	IMWG, CWR, MEP	2006	4	Republican Budget
15.2	Amend Water Code and develop and approve regulations for WQ management	Responsibility for WQ management assigned	Central Government (CG)	2006-2007	4	Republican Budget
15.3	Formalise coordination between WQ managers and monitors	Formalised WQ monitoring and management	IMWG, CG	2006	**2**	Republican Budget
15.4	Formalise coordination between RBOs and other Oblast organisations	Formalised WQ management	IMWG, CG	2006	**2**	Republican Budget
				Total	**12**	
2. Initial Steps to Institute the Management of Water Quality						
15.5	**Adopt the principles of the EUWFD**	Basis for WQ improvement established	CWR, MEP	**2006**	**0**	
15.5	Send students abroad to learn the principles of EUWFD	Qualified WQ managers	CWR, MEP	**2007-2010**	**(costed in Table 18.7)**	Republican Budget (IFIs)
15.6	Prepare a Strategy for the Improvement of Water Quality	Base for action on WQ	CWR	**2007**	**25**	Republican Budget (IFIs)
15.7	Rebuild water quality labs in RBOs	RBOs capable of WQ management	CWR, RBOs, CG	**2007-2010**	**(costed in Table 18.2)**	Republican Budget (IFIs)
				Total	**25**	

Table 18.9: Plan and Estimated Costs for Improving the Efficiency of Water Use

No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
1. Coordinate Efforts in Improving Water Use Efficiency						
16.4	IWMG to facilitate coordination for WE improvement	Coordination for WE	IMWG, CWR, MoA	2006	4	Republican Budget
16.5	Investigate potential for regional coordination of assessing solutions to WE	Regional Coordination for WE	CWR, MoA	2006	Not calculated	Republican Budget (IFIs)
16.6	Assess and ensure environmental and ecological water requirements	Improved environmental flows in rivers	CWR, MEP	2006-2010	Not calculated	Republican Budget
2. Improve WE in the Domestic Subsector						
16.7	Begin a national programme of loss reduction	Reduced leakage losses in urban water supplies	CWR, Vodokanals, Vodkhoz	2007-2010	Not calculated	Republican Budget
16.7	Determine and apply rational water tariff rates and collection schemes	Improved income for service providers	CWR, Vodokanals, Vodkhoz	2006-2007	Not calculated	Republican Budget
16.7	Change government policy to support water tariffs and use of income by service providers	Improved income for service providers	Central Government	2006-2007	Not calculated	Republican Budget
16.7	Prepare and execute a Public Awareness campaign including programmes in schools	Improved water conservation in the home	CWR, Vodokanals, Vodkhoz	2006-2010	Not calculated	Republican Budget
				Total	**Not calculated**	

Table 18.9 (continued): Plan and Estimated Costs for Improving the Efficiency of Water Use

No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
3. Improve WE in the Industrial Subsector						
16.8	Establish dialogue on industrial water tariffs and agree new rates	Rationalised water tariff structure	Ass. Vodokanals, CWR, Industry	2006-2007	Not calculated	Republican Budget
16.8	Develop approach to monitoring water consumption by industry	Improved monitoring	CWR, RBOs	2006	Not calculated	Republican Budget (IFIs)
16.8	Increase inspector staff in RBOs and provide new training	Improved water use inspections	CWR, RBOs	**2007-2010**	**Costed in Table 8.2**	Republican Budget (IFIs)
16.8	Assess government policy on the 'polluter pays' principle and adopt	Reduced pollution in rivers	Central Government, MEP	**2006-2007**	**Not calculated**	Republican Budget (IFIs)
16.8	Assess legal requirements for adopting 'polluter pays' principle and amend as necessary	Reduced pollution in rivers	Central Government, MEP, CWR, MoJ	**2006-2007**	**Not calculated**	Republican Budget (IFIs)
				Total	**Not calculated**	
4. Reverse the deterioration of irrigation infrastructure						
16.10	Make a policy decision to improve irrigation infrastructure and ensure proper financing	Basis for financial inputs to improve infrastructure	MoA, Central Government	**2006**	**0**	
16.10	Vodkhoz complete an assessment of infrastructure	Base line for investment and improvement	MoA, Local Admin	**2007-2008**	**350**	Republican Budget (IFIs)
16.10	Vodkhoz develop an Asset Management System and Plan	Tool developed for improving infrastructure	MoA, Local Admin	**2007-2008**	**25**	Republican Budget (IFIs)
16.10	Improve irrigation infrastructure based on the AMP	Functional irrigation systems	MoA, Local Admin	**2009 - 2020**	**Not calculated**	Republican Budget
				Total	**375+**	

Table 18.9 (continued): Plan and Estimated Costs for Improving the Efficiency of Water Use

No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
5. Improve water pricing and tariffs						
16.11	Make a policy decision to rationalise tariff structures	Improved revenue stream for infrastructure O&M	MoA, Central Government	2006	0	
16.11	Analyse possible tariff structures and rates for approval by government	Rationalised tariff structure	MoA, Central Government, Local Admin	2006-2007	25	Republican Budget (IFIs)
16.11	Apply new tariff structure	Improved revenue stream for infrastructure O&M	Central Government, Local Admin	2008 and onward	Not calculated	
				Total	**25+**	
6. Improve farm application methods						
16.12	Assess potential of improved technologies in Kazakhstan	Potential for adopting new technologies determined	MoA, Local Administration, CWR	2006-2007	15	Republican Budget (IFIs)
16.12	Assess potential for land levelling in areas of Kazakhstan	Knowledge of value of land levelling by area	MoA, Local Administration, CWR	2006-2007	70	Republican Budget (IFIs)
16.12	Assessment of best practice in irrigation	Knowledge of best practice in irrigation	MoA	2006-2007	70	Republican Budget (IFIs)
16.12	Assessment of training methods	Best training methods established	MoA	2006-2007	70	Republican Budget (IFIs)
16.12	Pilot studies for training	Training programme	MoA	2007-2008	100	Republican Budget (IFIs)

		established				
16.12	Conduct large scale training of farmers		MoA, Local Administration	2008-2012	500	Republican Budget (IFIs)
16.12	Feasibility Study on irrigation efficiency improvement	Plan of action for improving water use efficiency in irrigation	MoA, Local Administration	2007-2008	140	Republican Budget (IFIs)
16.12	Carry out Water Efficiency programme according to Feasibility Study	Improved water use efficiency for irrigation	MoA, Local Administration	2008-2015	Not calculated	Republican Budget (IFIs)
				Total	965+	

Table 18.10: Plan and Estimated Costs for Improving Transboundary Water Cooperation

No.	Item	Form of Outcome	Implementing Agency	Implementation Schedule	Estimated Cost, KZT million	Source of Financing
1	2	3	4	5	6	7
17.4	Finalise and Approve the National IWRM and WE Plan	Approved IWRM Plan	CWR, Central Government	2006	Costed in Table 18.1	Republican Budget
17.5	Prepare and approve the National Water Policy	Approved Water Policy	CWR, Central Government	2006	Costed in Table 18.1	Republican Budget (IFIs)
17.6	Strengthen the legal base	Stronger legal base	CWR, MoJ, Central Government	2006-2007	Costed in Table 18.1	Republican Budget
17.6	Build capacity in international water law	Improved legal capacity	CWR, MoJ, ME&S	2006-2010	Costed in Tables 18.1 and 18.7	Republican Budget (IFIs)
17.7	Improve the status of CWR and RBOs	Stronger negotiating position	CWR, RBOs, Central Government	2006-2007	Costed in Table 18.1	Republican Budget
17.8	Improve the capacity of CWR and RBOs	Improved capacity	CWR, RBOs, Central Government	2006-2015	Costed in Table 18.2	Republican Budget (IFIs)
17.9	Improve monitoring and information management	Improved information	CWR, RBOs, others	2006-2015	Costed in Tables 18.3, 18.4 and 18.6	Republican Budget (IFIs)
17.10	Improve the efficiency of water use	More water	CWR, MoA, others	2006-2015	Costed in Table 18.9	Republican Budget (IFIs)
17.11	Meet the requirements of international conventions	Stronger negotiating position	CWR, MFA, Central Government	2006-2010	Not calculated	Republican Budget (IFIs)
17.12	Improve the development of bilateral water agreements	Improved transboundary water agreements	CWR, RBOs, MFA Central Government	**2006-2010**	Not calculated	Republican Budget (IFIs)
17.13	Support the development of regional, multilateral agreements	Improved transboundary water agreements	CWR, Central Government, MFA	**2006-2020**	**Not calculated**	Republican Budget (IFIs)
				Total	**Not calculated**	

Table 18.11: Summary of Initial Steps (to 2010) Toward Achieving IWRM in Kazakhstan with Estimated Costs (Page 1 of 4)

Plan Section	Steps in Establishing IWRM in Kazakhstan	Responsibility *	2006 1 2 3 4	2007 1 2 3 4	2008 1 2 3 4	2009 1 2 3 4	2010 1 2 3 4	Cost Estimate (mKZT)
5	**Improve Overall Governance in IWRM**							
5.1	Finalise and Submit National IWRM Plan to government for approval	CWR	X					2
5.1	Present the National Plan at the IVth World Water Forum	CWR, i	X					2
5.1	Approve and adopt the National IWRM and WE Plan	CG	X					0
5.2	Prepare a National Water Policy	CG, CWR (c,i)	X					10
5.3	Invite CWR as a member to Comm. for Sustainable Development	CG	X					0
5.4	Ensure sufficient financing for water management	CG	X					0
							Total	**14**
6.1, 7.1	**Increase the Authority of CWR**	CG			X			
6.1	Continue Interministerial Working Group (IWG) on status of CWR	CG	X					2
6.1	Assess options and select best option for CWR	CG	X					1
6.1	Create a new State Agency for Water Resources, OR	CG		X				20
6.1	Create a new Ministry for Water Resources	CG			X			unknown
							Total	**23+**
6.2	**Increase the Authority of RBOs**	CG			X			
6.2	Interministerial Working Group to consider RBO status	CG	X					2
6.2	Establish RBO as the authority for river basin	CG			X			0
							Total	**2**
6.3	**Establish and Support RBCs**	CG, CWR	X				>	
	Establish remaining six RBCs	CG, CWR	X					16
	Support and finance operations of RBCs							100
	Assess and amend legal base as necessary							20
	Determine how to ensure stakeholder participation							20
							Total	**156**
6.4	**Decrease Fragmentation in Water Management Functions**	CG, CWR						
	IWG to develop plan for decreasing admin. fragmentation	CG, CWR	X					2
6.5	**Coordinate the Legal Foundation in Water and Environment**	CG, CWR		X				
	Ministry of Justice assign staff to coordinate laws and codes	CG	X					4
	All water-related ministries assign legal staff for coordination	CG	X					4
	Assess conflict between the Water Code and other legislation	CG, CWR						4
							Total	**12**
6.6	Rationalise public sector salaries	CG					>	NC
6.7	Rationalise financing for water management	CG					>	NC

Central Government	CG	Others:	
Committee for Water Resources	CWR	River Basin Organisations	RBO
Potential project for consultant	c	Local Administration	LA
Potential project for international support	i	NC = Not Calculated	
Ministry for Environmental Protection	MEP		

Table 18.11: Summary of Initial Steps (to 2010) Toward Achieving IWRM in Kazakhstan with Estimated Costs (Page 2 of 4)

Plan Section	Steps in Establishing IWRM in Kazakhstan	Responsibility *	2006 1 2 3 4	2007 1 2 3 4	2008 1 2 3 4	2009 1 2 3 4	2010 1 2 3 4	Cost Estimate (mKZT)
7	**Rebuild Capacity in CWR**							
7.2	Increase staff and budget for CWR	CG	X	X	X	X	X >	44
7.2	Apply for budget for CWR staff increases	CWR	X X	X X	X X	X X	X X	1
7.2, 7.3	**Establish the National Water Information Centre**	CG, CWR (i)		X				30
							Total	**75**
8	**Rebuild Capacity in RBOs**							
8.2	**Increase staffing and budgets in RBOs**	CG, CWR	X	X	X	X	X >	500
	Apply for budget for RBO staff increases	RBO, CWR	X X	X X	X X	X X	X X	1
8.3	**Introduce Planning into RBOs**	RBO, CWR		X			X >	
	Replace Annual Reports with RB IWRM and WE Plans	RBO		X				100
	Complete Schemes for CUPWR in all basins	RBO, CWR (c,i)					X	1000
	Complete EUWFD RBManagement Plans in all basins	RBO (c,i)					beyond 2010	3000
8.4	**Specify water quality management function in RBOs**	CG, CWR	X					
	Amend Water Code for the wq management function in RBOs	CG, CWR	X					2
	Include RBO wq responsibility in the Environment Code	CG, CWR, CEP	X					4
8.4	**Re-establish water quality labs in RBOs**	CG, CWR (c,i)					>	
	Carry out feasibility study on WQ labs in RBOs	CWR, RBO (c,i)		X				150
	Develop WQ labs as per feasibility report	RBO, CWR				X		1000
	Develop a Strategy for the Improvement of Water Quality (each RBO)	RBO (c,i)		X			X	500
	Carry out an RBO Information Capacity Building Project	RBO, CWR (c,i)		X				500
							Total	**6757**
9	**Establish and Develop Eight RBCs**							
9.2	Establish remaining six RBCs	CWR, RBO (c,i)	X X X X					16
9.3	Support and finance operations of all RBCs	CWR, RBO (c,i)					>	100
9.4	Assess and amend legal base as necessary	CWR, MoJ	X	X			>	20
9.5	Determine how to ensure stakeholder participation	CWR, RBO (c,i)	X					20
								156
10	**Rebuild Capacity in Surface Water Monitoring**							
10.3	Improve regulatory and legal framework	CEP, CWR				X		78
10.5	Develop and re-equip monitoring network	CEP, NHMS					>	14642
10.5	Organise and develop monitoring network at river basin level	NHMS, RBO					>	181
10.6	Develop information technology and communications	NHMS, CWR					>	618
10.7	Improve research and methodology	NHMS, CWR					>	487
10.8	Strengthen international cooperation	NHMS, CWR					>	65
10.9	Train staff for monitoring and ecological assessment	NHMS, CWR					>	257
							Total	**16328**

Central Government	CG	Others:	
Committee for Water Resources	CWR	River Basin Organisations	RBO
Potential project for consultant	c	National Hydrometric Monitoring System (Kazhydromet)	NHMS
Potential project for international support	i	Ministy of Justice	MoJ
Ministry for Environmental Protection	MEP	Local Administration	LA

Table 18.11: Summary of Initial Steps (to 2010) Toward Achieving IWRM in Kazakhstan with Estimated Costs (Page 3 of 4)

Plan Section	Steps in Establishing IWRM in Kazakhstan	Responsibility *	2006 1 2 3 4	2007 1 2 3 4	2008 1 2 3 4	2009 1 2 3 4	2010 1 2 3 4	Cost Estimate (mKZT)
11	**Rebuild Capacity in Groundwater Management**							
11.2	Improve coordination between water management organisations	CG, MEMR		X				2
11.4	Improve the SSWM management system	CGSS				X		120
11.4	Improve the SSWM information base at the river basin level	DoG, RBO					>	38
11.5	Improve the SSWM observation network	CGSS (i)					>	576
11.6	Improve the SSWM assessment and information capability	CGSS, CWR (c,i)				X		120
11.6	Improve the SSWM forecasting system	CGSS (c,i)					>	
							Total	**856**
12	**Improve Land Management and Monitoring**							
12.2	Study to assess necessary legal reforms	ALRM, MoJ (c,i)		X				26
12.2	Develop and amend legislation on land management	ALRM, MoJ		X				8
12.3	Develop regulations for monitoring of land resources	CG, ALRM, MIT		X				12
12.4	Improve the monitoring network:							
12.4	Conduct study to establish monitoring standards	ALRM (c,i)		X				60
12.4	Establish national, regional and oblast land management centres	CG, ALRM					>	600
12.4	Improve coordination between ALRM, CWR and RBOs and CEP	ALRM, CWR, CEP				X		15
12.4	Improve and modernise land monitoring system	ALRM, CEP (c,i)					>	1000
12.4	Establish special ecological observation stations	ALRM (i)					X	2000
12.4	Establish special monitoring stations in areas of concern	ALRM (i)					X	100
12.4	Procure mobile laboratories	ALRM (i)		X				300
							Total	**4121**
13	**Improve Information Management**							
13.3	Build information capacity in water management organisations	CWR, RBOs (c)					X	88
13.4	Identify information needs for water management	CWR, RBOs (c)			X			20
13.5	Improve interaction and coordination for information management	IMWG, CWR				X		44
13.6	Establish the base for information infrastructure in water management	IMWG, CWR				X		250
13.7	Establish and operate UIS in the river basins	CWR, RBOs (c)					X	635
							Total	**1037**
14	**Improve Education and Public Awareness**							
14.4	Prepare a programme for educating students abroad	CWR, MEP, ME&S	X					15
14.4	Educate students abroad	CWR, MEP, ME&S					>	300
14.5	Improve higher education in water management	CWR, MEP, ME&S					>	19
14.6	Introduce water and environment into schools	CWR, MEP, ME&S					>	1580
14.7	Increase public awareness in water issues	CWR, MEP, IMWG		X				10
							Total	1924

Central Government	CG	Ministry of Energy and Mineral Resources	MEMR
Committee for Water Resources	CWR	Agency for Land Resource Management	ALRM
Potential project for consultant	c	Minstry of Justice	MoJ
Potential project for international support	i	Ministry of Industry and Trade	MIT
River Basin Organisations	RBO	Ministry of Education and Science	ME&S
Ministry for Environmental Protection	MEP	Committee for Geology and Sub-Soils	CGSS
National Hydrometric Monitoring System (Kazhydromet)	NHMS	Local Administration	LA

Table 18.11: Summary of Initial Steps (to 2010) Toward Achieving IWRM in Kazakhstan with Estimated Costs (Page 4 of 4)

Plan Section	Steps in Establishing IWRM in Kazakhstan	Responsibility *	2006 1 2 3 4	2007 1 2 3 4	2008 1 2 3 4	2009 1 2 3 4	2010 1 2 3 4	Cost Estimate (mKZT)
15	**Institute the Management of Water Quality**							
15.2	Formalise the responsibility for water quality management	IMWG, CWR, RBOs		X				12
15.5	Adopt principles of EUWFD	CWR, MEP						NC
15.5	Send students abroad to learn EUWFD	CWR, MEP, ME&S					>	#
15.6	Prepare a Strategy for the Improvement of Water Quality	CWR, MEP, RBOs		X				25
15.7	Rebuild water quality labs in RBOs	CWR, RBOs					>	#
							Total	**NC**
16	**Improving the Efficiency of Water Use**							
16.4-16.6	Coordinate Efforts in Improving Water Use Efficiency	IMWG, CWR, MoA	X					4
16.7	Improve WE in the Domestic Subsector	CWR, VK, VodK					>	NC
16.8	Improve WE in the Industrial Subsector	CWR, VK, Ind.					>	NC
16.10	Reverse the deterioration of irrigation infrastructure	MoA, CG					>	375+
16.11	Improve water pricing and tariffs	MoA, CG			X			25+
16.12	Improve farm application methods	MoA, CG					>	965+
							Total	**NC**
17	**Improving Transboundary Water Cooperation**							
17.4	Finalise and Approve the National IWRM and WE Plan	CWR, CG	X					#
17.5	Prepare and approve the National Water Policy	CWR, CG	X					#
17.6	Strengthen the legal base	CWR, MoJ, CG		X				#
17.6	Build capacity in international water law	CWR, MoJ, CG					>	#
17.7	Improve the status of CWR and RBOs	CWR, RBOs, CG		X				#
17.8	Improve the capacity of CWR and RBOs	CWR, RBOs, CG					>	#
17.9	Improve monitoring and information management	many					>	#
17.10	Improve the efficiency of water use	MoA, CWR					>	#
17.11	Meet the requirements of international conventions	CWR, CG, MFA					>	NC
17.12	Improve the development of bilateral water agreements	CWR, CG, MFA					>	NC
17.13	Support the development of regional, multilateral agreements	CWR, CG, MFA					>	NC
							Total	**NC**

Central Government	CG	Ministry of Energy and Mineral Resources	MEMR
Committee for Water Resources	CWR	Agency for Land Resource Management	ALRM
Potential project for consultant	c	Minstry of Justice	MoJ
Potential project for international support	i	Ministry of Industry and Trade	MIT
River Basin Organisations	RBO	Ministry of Education and Science	ME&S
Ministry for Environmental Protection	MEP	Committee for Geology and Sub-Soils	CGSS
National Hydrometric Monitoring System (Kazhydromet)	NHMS	Vodokanals	VK
Note: # = costs accounted for in other sections		Vodkhoz	VodK
NC = Not Calculated		Industry	Ind.
		Local Administration	LA