Integrated Water Cycle Management in Kazakhstan

Tempus

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Chapter 6

Integrated Water Cycle Management for Kazakhstan

6. Integrated Water Cycle Management for Kazakhstan

6.1 European Water Framework Directive

Lian Lundy and Burghard C. Meyer

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Introduction

The subchapter gives an overview about the key aspects of the European Union Water Framework Directive (WFD) including:

- an introduction to the WFD (why it was required and related policy, management and planning activities).
- time lines established for all surface and groundwaters to achieve 'good status'
- an overview of the WFD implementation in all Member States
- a focus on the WFD implementation in Germany as an example of the challenges and progress made in a country with transboundary catchments

The WFD was published in 2000, the end result of 5 years of intense negotiation between a range of experts, stakeholders and policy-makers from across the EU (CIS, 2003; EU WFD 2000). The WFD establishes a framework for the protection of surface, ground, transitional and coastal waters throughout the EU, with an overall aim of all waters achieving "good water status" by 2015. The WFD framework provides an integrated approach to protecting and enhancing the status of water resources, promoting sustainable water use, reducing the emission of priority substances, ceasing emission of priority hazardous substances and mitigating the effects of floods and droughts. It involves the development of a catchment-based approach to support the long-term management of all water resources, based on a combined assessment of a water body's biological, chemical and hydrogeomorphological components.

Why was the WFD needed?

The WFD was introduced in response to a range of drivers. Firstly, previous to the development of the WFD, the management of EU waters was highly fragmented, being covered by a range of sometimes conflicting legislative requirements (EC, 2010). The WFD addresses this through bringing together measures for the protection of all waters for all purposes within a single framework, an approach that has progressively led to the replacement of seven major EU Directives (see Table 6.1.1). Secondly, it addresses the need for increased public participation (see sub-chapter 3.6) as a basis for sustainably managing a common resource (EC, 2014). Increased public participation (defined as the involvement of stakeholders within decision-making processes) is seen as a mechanism which can enhance the acceptability of measures proposed and therefore the level of implementation or 'buy in' of management plans developed. The WFD clearly states that public participation is crucial to sustainably manage water resources with activities it requires identified in Article 14 (WFD, 2000).

Table 6.1.1 Overview of timeline for the phase out of Directives being replaced by the WFD

Timeline	Directives being replaced
Replaced by the end of 2007	Surface Water Abstraction Directive - 75/440/EEC
	Exchange of Information on Surface Water Decision - 77/795/EEC
	Surface Water Abstraction Measurement / Analysis Directive - 79/869/EEC
Replaced by the end of 2013	Freshwater Fish Directive - 78/659/EEC
	Shellfish Waters Directive - 79/923/EEC
	Groundwater Directive - 80/68/EEC
	Dangerous Substances Directive - 76/464/EEC

A further driver for change is that a range of earlier directives targeted emissions from industry (e.g. IPPC, 2008) and municipal wastewater treatment plants (e.g. Urban Waste Water Treatment (UWWT) directive). Whilst not universally effective, implementation of these directives has significantly reduced the emissions from several industrial sectors and spheres of practice to such an extent that achieving further improvements requires the targeting of diffuse sources of pollution. The term diffuse pollution refers to pollution that is not readily assignable to a specific point source e.g. discharge of runoff

from urban surfaces or agricultural lands into rivers, and its need for mitigation is specifically referred to in Article 10 of the WFD.

How is the WFD being implemented?

The key activities European Member States (MS) are required to take, their deadline for implementation and the part of the WFD which requires the activity to be taken are identified in Table 6.1.2. The key instruments for supporting implementation of the WFD are the river basin management plans (RBMP) and associated programmes of measures (PoMs) (EC, 2012). Development of RBMPs requires MS to identify all river basin districts (RBD) within their national territory and identify competent authorities responsible for the development and implementation of associated plans and requirements. Once each RBD has been identified, it must then be fully characterised by undertaking analyses of the pressures and impacts affecting all water bodies, an economic analysis of water uses and the identification of protected areas. All MS then needed to work collaboratively with the EU to develop a robust ecological status classification system (involving the development of standards for a range of standard water quality parameters) and to subsequently monitor and establish the status of all waters within each RBD. Having established their current status, MS were required to develop objectives for each water body and publish PoMs which outline how each water body within each RBD is to cost-effectively achieve the required 'good status'. Use of the term 'cost effectively' is important as the WFD recognises that it will not be cost effective for all waters to achieve good status e.g. those who have been significantly altered by channelization for purposes of flood management. Such water bodies are to be identified as heavily modified water bodies and instead of achieving good ecological status are to achieve 'good ecological potential', a classification which takes into account the maximum quality a water body could achieve given the type and level of modification a water body has undergone (WFD UK TAG, 2008). Associated with these activities, is the development of water pricing policies that contribute to enhancing the sustainability of water resources. As can been seen from Table 6.1.2, these activities take place over a 6-year cycle (the time period between transposition of the Directive in 2003 and the deadline for publishing of all RBMPs by 2009). The development and implementation of the RBMPs and PoMs is subject to continual monitoring and evaluation of their effectiveness in achieving their specified objectives in relation to the WFD objectives. Information generated by these processes is to inform two further management cycles which have been mapped out with associated objectives deadlines of 2015 (to meet the WFD's environmental objectives) and 2021 (final deadline for achievement of all requirements), an approach which recognises both the time required to implement PoMs and that different MS face a wide variety of social, economic and environmental challenges in achieving WFD compliance.

Table 6.1.2 Timeline for implementation of the WFD requirements (taken from http://ec.europa.eu/environment/water/water-framework/info/timetable_en.htm)

Year	Activities	WFD article
2000	Directive entered into force	Art. 25
2003	Transposition in national legislation; Identification of River Basin Districts and Authorities	Art. 23 & 3
2004	Characterisation of river basin: pressures, impacts and economic analysis	Art. 5
2006	Establishment of monitoring network; Start public consultation (at the latest)	Art. 8 & 14
2008	Present draft river basin management plan	Art. 13
2009	Finalise river basin management plan including programme of measures	Art. 13 & 11
2010	Introduce pricing policies	Art. 9
2012	Make operational programmes of measures	Art. 11
2015	Meet environmental objectives; First management cycle ends; Second river basin management plan & first flood risk management plan.	Art. 4
2021	Second management cycle ends	Art. 4 & 13
2027	Third management cycle ends, final deadline for meeting objectives	Art. 4 & 13

How are Member States progressing with implementing WFD requirements?

To get an overview on the progress of the implementation of the WFD by the EU member states the EU Commission has to assess the process in certain intervals (Article 18 WFD) to inform the European Parliament, the Council and the public. Three reports have been published:

- 1st implementation report on the first stage of implementation (22 March 2007)
- 2nd implementation report on monitoring networks (1 April 2009)
- 3rd implementation report on the River Basin Management Plans (November 2012)

The 3rd report has to include (among other things) a review of progress in the implementation of the Directive and a survey of the River Basin Management Plans submitted in accordance with Article 15, including suggestions for the improvement of future plans (EC 2012a). Following its publication, this 3rd WFD implementation report was adopted on 14/11/2012 and consists of the following documents:

- A Commission report to the European Parliament and the Council on the implementation of the Water Framework Directive - River Basin Management Plans (COM(2012)670 of 14.11.2012) (available in all EU languages; EC2012b),
- An European Overview – Commission Staff Working Document accompanying the report in 2 volumes,
- Country-specific assessments for EU Member States and Norway (Volumes 3-30).

The 3rd WFD implementation report shows that most of the EU member states have reached their target goals with 23 Member States having adopted and reported all their river basin management plans. Four Member States (Belgium, Greece, Spain and Portugal) have either not adopted plans or only adopted and reported some plans. Of the 174 RBMPs expected, the Commission report they have received 124 RBMPs with 75% of these concerning transboundary river basins (EC2012b).

Progress on implementation: the example of Germany

The implementation of the WFD has totally changed the basis of administrative approaches for the organisation, monitoring and decision making of water bodies in Germany, from a previous approach based around administrative districts to that which uses a catchment / river basin delimitation for supporting management at a catchment scale. This includes an international perspective (in transboundary catchments). Using the Elbe river basin as example, its catchment area includes 10 German counties (provinces) and parts of the Czech Republic, Poland and Austria, and is jointly managed by the River Basin Community (RBC). At an international level the RBC was created to coordinate the international sub catchments and is led and managed by the Czech Republic to focus on transboundary problems which include Austria and Poland. In Germany the structure of the RBC is organised into 5 national sub catchments of the Elbe as coordinating areas for management activities. (http://www.fgg-elbe.de/fgg-elbe-en.html)

"The River Basin Community (RBC) Elbe is responsible for both national and international water management cooperation and coordination as well as flood risk management in the German section of the Elbe River Basin District. The RBC Elbe takes on the task of a national office for water management cooperation and coordination in accordance with the Water Framework Directive (WFD). Furthermore, the RBC Elbe has the task of implementing the Flood Risk Management Directive (FRMD) through the assessment and management of flood risks. To this end, the Federal German States' representatives in the RBC Elbe's bodies (Elbe-Ministerial Conference, Elbe-Council, and Coordinating Council) cooperate with Federal experts in various task forces (on surface water, groundwater, data, flood risk management, economics)." Citation: http://www.fgg-elbe.de/aufgaben-en.html .

The stepwise approach of the timeline for implementation (see Table 6.1.2) has required the RBC to clarify multiple aspects in terms of data sampling, digital data storage, clarification of terms and critical thresholds, environmental quality standards and objectives, technical feasibility and data overlaying and conflict analysis to solve the multifunctional management problems associated with the integrated management of a large transboundary basin. To facilitate this, the RBC developed, verified scientifically, discussed with a range of stakeholders including the general public and finally adopted a series of reports to support and inform water management initiatives. These

documents are freely available on the internet in the Elbe Data Information System and include:

- background documents summarising basic characteristics of the Elbe catchments, sub-catchments and supporting data;
- the criteria used for assessing the significance of any identified burdens;
- identification of:
  - water bodies that are used for the abstraction of drinking water (Article 7 , Section 1 of the WFD);
  - drinking water protected areas (Article 7, paragraph 3 WFD);
  - recreational waters (bathing waters) (Annex IV iii 1 WFD);
  - EC Birds and Habitats Directive areas (Annex IV 1 v WFD);
  - fisheries waters in accordance with Directive 78/659/EEC;
- Environmental Quality Standards for:
  - pollutants to support assessment of ecological status / potential;
  - pollutants for assessing the chemical status;
  - priority substances and certain other pollutants
- A procedure for the determination of environmental objectives in the German part of the Elbe catchment area;
- A list of the environmental objectives for surface waters and groundwater;
- Criteria to be used to assess requests exemptions e.g. natural conditions, technical feasibility or disproportionate costs;
- A compilation of the feedbacks and opinions received through other regional competent authorities

Application of the WFD in Germany

Figure 6.1.1 gives an overview of the river catchments in relation to German national and international country boundaries. The river catchments are the basis of the development of WFD-compliant management plans. The numbering gives a full orientation about the spatial context of each catchment.

Having identified catchments within and across Germany and its borders, each catchment is then characterised in terms of its number of rivers, lakes, transitional and coastal Water bodies. Each water body is then further characterised to identify key pressures which impact on the ecological health of the water body (see Table 6.1.3) by the RBDs.

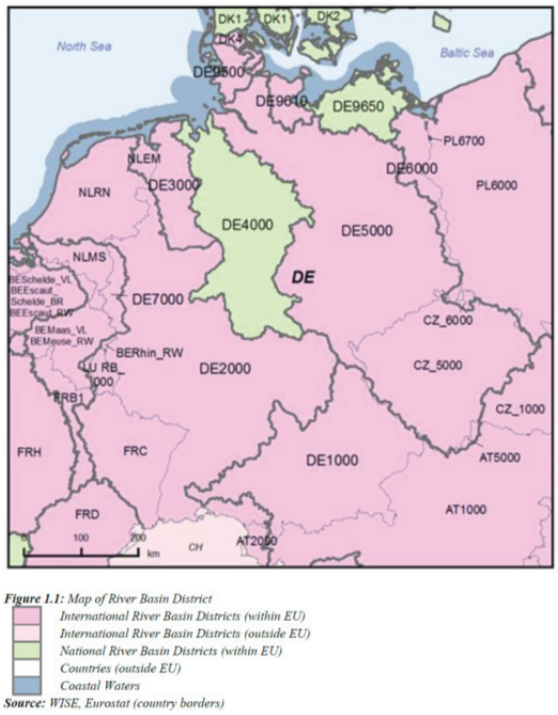

Figure 6.1.1 Map of German River Basin Districts in the European context (EC 2012) PL= Poland; CZ = Czech Republic; AT = Austria; CH = Switzerland; FRC = France; DK = Denmark)

Furthermore the ecological status for natural surface water bodies is classified into different classes of assessment using data generated from the use of a range of analytical methods in the fields of point pollution, diffuse pollution, water abstraction, water flow regulation and morphological alteration. Figure 6.1.2 on the ecological status of natural surface water bodies for Germany shows clearly the long way until the general goal of a good ecological status is reached.

Table 6.1.3 Number and percentage of surface water bodies affected by significant pressures in Germany (EC 2012)

RBD	No pressures		Point source		Diffuse source		Water abstraction		Water flow regulations and morphological alterations	
	No.	%	No.	%	No.	%	No.	%	No.	%
DE1000	155	23.1	110	16.39	352	52.46	88	13.11	386	57.53
DE2000	313	13.73	1403	61.56	1456	63.89	50	2.19	1767	77.53
DE3000	27	5.23	180	34.88	452	87.6	0	0	484	93.8
DE4000	88	6.22	296	20.93	1199	84.79	0	0	1303	92.15
DE5000	282	8.99	546	17.4	2385	76	42	1.34	2411	76.83
DE6000	52	10.34	40	7.95	369	73.36	3	0.6	367	72.96
DE7000	22	9.65	181	79.39	140	61.4	0	0	200	87.72
DE9500	7	4.29	0	0	156	95.71	0	0	136	83.44
DE9610	8	2.29	0	0	342	97.71	0	0	274	78.29
DE9650	53	8.82	6	1	518	86.19	0	0	499	83.03
Total	*1007*	*10.21*	*2762*	*28*	*7369*	*74.71*	*183*	*1.86*	*7827*	*79.36*

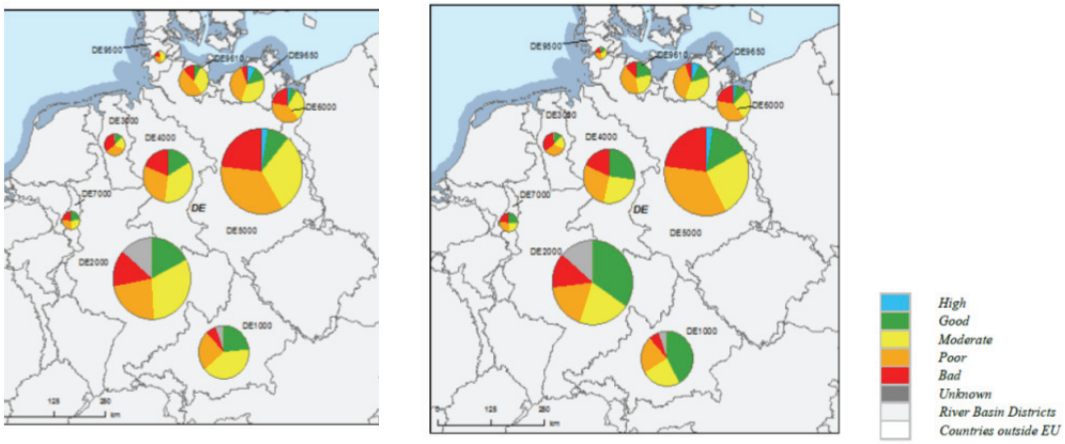

Figure 6.1.2 Map of the ecological status of natural surface water bodies for German River Basin Districts 2009 and planned for 2015 (EC 2012)

Figure 6.1.2 maps the predicted ecological status of surface water in Germany in 2015 following implementation of proposed programmes of measures in comparison to their ecological status in 2009 (EC 2012). It can be seen that significant improvement in ecological status especially in the Rhine and Danube River catchments are predicted. Improvement of the ecological status is recognised as a multi-factorial and multi-sectorial problem, and programmes of measures are hence collaboratively developed to measures related to agriculture sources and practices, hydro-morphology groundwater (quantitative status, chemical status), point and diffuse pollution water pricing policies and additional measures in protected areas, as required. Table 6.1.4 gives an example of the range of agricultural measures in the German RBMD planned and being applied. The measures identified in the different catchments target different aspects, and were selected from the large set of potential measures to best fit the particular catchment issues targeted. It should also be noted that a range of good measures (e.g. land use planning) are not being applied in the first period of reporting to the EU on WFD progress as Germany has opted to primarily use technical measures, economic instruments and non-technical measures in the first reporting period.

Conclusion

Taking over 5 years of intense negotiation, the WFD was a highly ambitious and challenging piece of legislation to develop. Its staged implementation over a 27 year time period is posing even greater challenges for all countries through out the EU. Key aspects of the WFD include:

- the requirement that, irrespective of national boundaries, water resources should be managed at the catchment scale
- a shift from a chemical standards only to an integrated biological, chemical and hydro-geomorphological approach to assessing the status of a water body

- specific reference to the need to address diffuse sources of pollution
- placing a strong focus on the need for stakeholder engagement.

To-date 124 of the expected 174 RBMPs have been submitted to the EU by the required deadlines, with the development of each plan based on a review and analysis of existing monitoring data (supplemented by a combination of further sampling campaigns and the use of predictive models, as required), existing policies and the environmental, social and economic implications of current water use practices. Thus these reports provide a scientifically robust and transparent basis on which to identify the key issues facing sustainable use of water resources at catchment to local scales, and the collaborative (i.e. multi-sectoral) development of programmes of measures to tackle these issues in a prioritised manner. With 75% of the EU's catchments requiring the development and implementation of transboundary management strategies, the on-going activities to support WFD implementation offer a rich source of data and case studies for integrated water cycle managers in Kazakhstan.

6.2 Management and Planning at River Catchment scale

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A basin – or reservoir – water system consists of a series of interconnected water bodies and hydraulic structures designed to ensure the rational use and protection of water resources. This includes the abstraction of waters from and discharge of wastewater effluents from agriculture, industry and the domestic sector into receiving water bodies: it is administered under a single water policy developed by the Government of Republic of Kazakhstan.

Basin management principle is a fundamental principle of IWRM

In the context of the river basin management, the operation of most of hydraulic facilities, as well as regulation of river flow and territorial distribution of water resources, are determined by a set of general rules for water resources use within the basin, regardless the location of specific water facilities, water consumers and water users. Firstly, it refers to water bodies and to intra-and inter-basin stream flows, which contribute to the regulation of the river basin as a whole. Each hydraulic unit in the basin is designed to regulate the contributing flow in accordance with predefined discharge schedules, calculated on the basis of the water basin management. Whilst the behaviors of water systems have certain autonomy within each basin, they characteristically interact at a basin level and are hence a kind of enlarged part of a larger basin system. Water systems of major river basins are accepted as major functional units, which serve as the basis for river basin water authorities. Small rivers are generally included in the control zone of river basin water management associations of major rivers. The Committee on Water Resources (CWR), a governmental organisation based in Astana, manages the use of water resources within the boundaries of all water basins and serves for the benefit of all sectors of the economy. A Basin Inspectorate on the Regulation of the Use and Protection of Water Resources has been formed in each of the 8 major river basins in KZ and regulates the use and protection of water resources within river basin boundaries. There is a Basin Water Management organization (BWM) within the CWR, which includes a Basin Inspectorate on the Regulation of the Water Resource Use and Protection for each of the 8 river basins. These Basin Inspectorates develop integrated water resources management plans and facilitate coordination between the stakeholders in each basin. These regional bodies of the CWR support an integrated water resources management and coordinate activities of the stakeholders in each the 8 major river basins: Balkash-Alakol, Zhaik-Caspian, Shu-Talas, Aral-Syrdarya, Nura-Sarysu, Tobyl-Torgai, Irtysh and Yesil.

The objectives of the regional bodies of the CWR are: 1) regulation of the water resources use to meet the needs of the population and industries, achievement and maintenance of an environmentally safe and economically optimal level of water use; 2) organization of the state control over the water resources use and protection.

The main functions of the regional bodies of CWR are: (Anonymous. 2010, Anonymous. 2013a)

1) support to integrated water resources management of hydrographic basin based on the basin principle;
2) coordination of the all parties of water relations on the use of water resources in order to achieve a positive economic effect based on reasonable, equitable and environmentally sustainable water use;
3) preparation and implementation of river basin agreements on restoration and protection of water bodies.
4) maintenance of public accounting, the State Water Cadastre and monitoring water basins;
5) the issuance, suspension and revocation of permits for special water use (e.g. for fire-fighting) in the manner prescribed by law;
6) determination of water use limits within the context of water users and the relevant basin;
7) participation in the organization and implementation of the competition for the provision of water bodies to individual or groups of uses;
8) participation with the Committee for Geology in the approval of underground water resources use?
9) harmonizing the complex water use and protection of the water sources of the relevant basin; harmonizing the rules of water bodies and operation of water facilities

10) formation of the Basin Council, consultations with the members of the Basin Council on the use and protection of water resources in the basin, the analysis of the recommendations prepared by the Basin Council, ensuring their implementation, forwarding recommendations of the Basin Council to concerned government agencies and water users.

The plans of complex use and protection of water resources in the basins (SCUPWR) are the basis of the implementation of IWRM in water basins.

The plans of complex use and protection of water resources in the basins (SCUPWR)

SCUPWR are data bases to support selection of optimal solutions for the design, planning and implementation of state, basin and regional programs aimed at sustainable use, restoration and protection of water bodies, including introduction of limits on water consumption and wastewater. The SCUPWR are specifically developed to support decision-making and the implementation of integrated water resources management approaches.

Table 6.2.1 Development of SCUPWR for water basins in the Republic of Kazakhstan since 2003

Number	Year of publication - Basin
1	2003 Ulken and Kishi Uzen
2	2004 – 2005 Ertish River
3	2006 - 2007 Yesil River
4	2006 – 2007 Nura River
5	2006 – 2007 Sarysu River
6	2006 – 2007 Tobyl River
7	2006 – 2007 Torgau-Irgiz River
8	2006 – 2007 Zhaik River
9	2007 – 2008 Shu River
10	2007 – 2008 Talas River
11	2008 – 2009 Syrdarya River
12	2008 – 2009 Ile River
13	2012 The General SCUPWR (16 volumes)

For the full-fledged implementation of IWRM The Republic of Kazakhstan will have to revise the established structure of the water management system and to shift to a new one, which is characterized by flexibility, dynamism and openness to continuous improvement, as well as based on the basin principle. These assumptions have been taken into account in the development and adoption of a new Water Code in Kazakhstan in 2003, and have been described in a number of new regulations governing the state water resources management. Thus, the key provisions of it are those which are devoted to basin agreements on rational use and protection of water bodies, as well as the creation of basin councils (Petrakov I. et al. (2007), Anomymous, (2005a), Anomymous, (2007)).

Basin Agreements

The basin agreements on restoration and protection of water bodies have been reached are between the river basin organizations, local executive bodies within each region (e.g. cities of republican status, capitals etc) and other entities located within the territory of water basins. Their aim is to integrate and coordinate water management activities, including the implementation of measures of restoration and protection of water bodies. The basin agreements identify each party's obligations, including specific protection measures to be taken in relation to agreed timelines. To achieve goals and objectives of the river basin agreements, individuals and legal entities (organizations) have to ensure funds availability based on the terms and forms established in the legislation of the Republic of Kazakhstan. These funds are intended solely for the activities related to the restoration and protection of water bodies.

Table 6.2.2 Overview of basin agreements for Basin Water Management in Kazakhstan

Number	Basin Water Management	Number of basin agreements
1.	Aral-Syrdarya	2
2.	Balkash-Alakol	absent
3.	Ertish	2
4.	Yesil	4
5.	Nura-Sarysu	2
6.	Tobyl-Turgai	1
7.	Shu-Talas	4
8.	Zhaik-Caspian	absent

Basin Agreements may be international (if they involve two or more countries) and/or domestic in nature (participating entities are representatives of the various structures of administrative units within Kazahkstan). These Basin Agreements are domestic (interstate) legal documents containing

mutual obligations of the parties to work towards water protection and water management. The agreements between the parties are currently voluntary and are based of equal terms. A prerequisite for signing agreements is a mutually beneficial cooperation between the parties.

Approaches to address the following issues are provided in the framework of the Basin Agreements and are including:

- protection of water resources from pollution, prevention of pollution transmission by water and restoration of water bodies to the best attainable status (chemical, environmental, etc.);
- prevention of the harm to the environment, economic facilities, property, life and health of the people from environmental excesses on water bodies;
- joint development and implementation of targeted programs of measures to ensure protection of water bodies and water resources;
- formation and maintenance of a monitoring system of water bodies; monitoring water quantity and quality in transboundary water bodies and regulated exchange of monitoring data.

Basin Councils

Formation of the Basin Councils is regarded as an essential component of an integrated approach to water resources management. They can provide necessary institutional framework for coordination of efforts of various categories of water users, public organizations dealing with water quality and other issues in management of water resources, land resources, environmental protection, and in ensuring drinking water quality,. It should be noted that practical and legal status of these basin councils are quite different in different countries (i.e. each of the transboundary countries sharing basins with Kazakhstan). In the European Union, the significance of the river basin management councils has increased following adoption of the EU Water Framework Directive in 2000 (2000/60 EC), given their significant role in coordinating the involvement of a wide range of stakeholders in the development, implementation, review and regular updates of basin water management plans on.

According to the Water Code of the Republic of Kazakhstan, the Basin Council is an advisory body established under the Basin Agreement. This means that it does not possess any regulatory powers, for example, it can approve neither legal documents nor generally binding regulations, also it cannot issue any permits (license) or carry out inspection activities or control state property. This agency is primarily intended to develop and make recommendations to the signatories of the Basin Agreement. The Basin Council in Kazakhstan, led by the head of the relevant basin authority includes the heads of local executive bodies (cities of republican status and Astana capital), heads of territorial bodies and representatives of water users. Basin Councils may also include representatives of public associations. The activity of a Basin Council is organized by the Basin Authority (Anonymous, 2005b). Currently, there are eight basin councils in the Republic of Kazakhstan, operating in the framework of the IWRM implementation of. In other words, there is a basin council in each of the water basins.

Basin plans for the IWRM implementation in Kazakhstan

The first IWRM planning program at a basin level in the Republic of Kazakhstan was developed and adopted between 2007 and 2009 by the Regional Environmental Centre for the Central Asia for the Balkash-Alakol Basin. Entitled "Integrated Water Resources and Water Conservation Basin Plan of Balkash-Alakol Basin", this plan has been developed jointly with China within the project of "Cross-border Dialogue and Cooperation in the Ile-Balkhash Basin". This project was a national component of the Program "Promotion of Integrated Water Resources Management and Fostering Transboundary Dialogue in the Central Asia" funded by a number of parties, including the European Union, the Government of Finland, and the United Nations Development Programme.

A brief overview of the Program is presented in "Sustainable Development of the Balkash-Alakol basin between 2007-2009 years" (Anonymous, 2013b). In summary the Program includes analysis of current trends in environmental and ecological status of water bodies in the Balkash-Alakol basin alongside with the measures for the rational use of water resources, ecosystem conservation, environmental improvement and social and economical development of the region. The paper uses scientific data to rationalize its proposals as to conservation of ecosystems of the Balkash-Alakol basin; stabilization of hydrological regimes and water levels of Lake Balkash; more efficient use of water resources; improvement of the social and demographic situation in the region; and creation of ecosystem

zones according to basin principles. In total the plan recommends the implementation of 39 activities, all of which have been implemented, including 9 scientific-research projects. Specific activities include assessment of the space-time redistribution of water resources in the basin taking into account environmental and social indicators. Further recommendations to improve basin systems of river runoff regulation and distribution have been proposed.

Review of the basin industrial companies has also been carried out in Alakol district. These involved identifications of the major sources of pollution and quantity assessment of the quality of air, water and soil. Assessment of the influence of anthropogenic factors on the health of the population in Balkhash-Alakol basin has also been carried out based on the development of database of the main demographic indicators (e.g. basic sanitation and environmental indicators) and overall morbidity of the population residing in the Balkhash-Alakol water basin region for the last 10-15 years. This database was used for the of the health status in the region contributing to a subsequent assessment of the role of production and economic activities. Mappings and hydrological information bases related to modern hydrographic networks were established. Patterns of relationships between ecosystem components and current states of biogeocenosis were analyzed, and the influence of anthropogenic factors on basin areas of Lake Balkhash and Alakol-Sasykkol was evaluated. Geographic Information System (GIS) data concerning the inflowing rivers with the contours of the watershed has been collected by the types of sources of incoming waters in the rivers.

The forecast of changes in water resources of Alakol basin is carried out and used as the basis of planning sustainable development of natural and economic systems of the region. Geobotanic maps of the basin environmental status were developed.

Extensive field work was undertaken to study the dynamics of ecosystems in the region. Analysis of the current status of ecosystems was provided based on the cadastral characteristics and cartographic materials developed using data collected during field expeditions and research, as well as satellite imagery data. Analysis of the economic use of water resources was conducted in the basins of the River Ile, Lake Balkhash and Lake Alakol. A map describing hydroecological situation in the Lake Alakol basin was developed based on the research data. A probabilistic forecast of changes in water resources of Balkhash-Alakol basin was developed. Data pertaining to hydrological regime and use of water resources in the Balkhash-Alakol basin was collected including the analysis of the water demands of various industries. Assessment of irrecoverable loss of water as well as water transportation losses was carried out. Assessment of the status of the irrigation systems in the region became possible due to creation of a scientific basis for mapping natural resource potentials and environmental conditions within the territories of the Balkhash-Alakol basin. Complete set of results of all the above studies is available in the Reports (Anonymous, 2013b). The programme implementation of the "Sustainable Development of the Balkash-Alakol Basin" was finalised in 2010. It's cost made up 58,6 million Tenge (that is about 400.000 U.S. dollars).

Conclusion

The use of basin principles approach is now the basis of water resources management in the Republic of Kazakhstan. As required under an IWRM approach, BWM organizations (territorial bodies that carry out strategic water management and coordination between the stakeholders.) have been established within each of the 8 water basins in Kazakhstan, and each BWM is going through the process of signing basin-specific agreements.

6.3 Rural water supply system as the basis for local water resources management in Central Asia and in the Republic of Kazakhstan

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Introduction

Rural water supply systems are very important for all the countries of Central Asia whose economies are based on agriculture. In the former Soviet Union centralized systems for agricultural water supply were well established. For example, in Kyrgyzstan during the 1990s, 75% of the population in the countryside used such systems. In contrast, centralized sewerage systems were less developed and in those days, only 8% of the population in rural areas enjoyed centralized sanitation systems.

Water supply in rural areas of Kazakhstan

Water supply systems in rural areas deliver water not only to the settlements, but also to state and collective farms which utilize water for animals and for various activities associated with agricultural product processing. During the 1990s, the restructuring of agricultural sector led to the changes in the system of rural water supply. State´s technical and financial support of collective and state farms ceased and village councils (whose financial resources had decreased), had neither technical means nor necessary skills to manage these systems and keep them in good working condition.

This change has entailed negative consequences, not only for the living conditions of the local population, but also significantly affecting human health. Currently most of the rural population is suffering from various diseases related to poor water quality, such as diarrhoea, typhoid and dysentery. In those countryside areas where water supply systems are no longer functioning, the population has no access to safe water. Most localities do not have individual wells and hand pumps, and in those places where such wells exist, they are not deep enough and they are often contaminated. In many localities water is extracted by electric pumps, but frequent failures in the supply of electricity eventually result in the pump breakage, thus leaving the population without water for several days at a time.

The status of rural water supply in Kazakhstan remains extremely unsatisfactory. In Northern Kazakhstan, intermittent water supplies are delivered by communal water works, leaving many rural areas without drinking water for long periods of time requiring them to use other sources of water, such as melting snow. Many water pipes have been dismantled and are inactive and the number of such pipes is increasing. Since 1998, for example, the number of functioning pipes in the Kostanai region has decreased by 18 water pipes and in the Kyzylorda region by 32 water pipes (Anonymous, 2004, Anonymous, 2014). According to Ministry of Agriculture (2010) the availability to tapwater in rural areas increased from 12% to a total of 41% in the last years. In addition, of the 7002 defined rural areas, 3849 of them with the population of about 3 million people (or 40 % of the total rural population) have unsecured drinking water (Table 6.3.1) (Petrakov, 2007; Anonymous, 2014).

Table 6.3.1 Villages by drinking water categories, Republic of Kazakhstan

Drinking water categories	Descriptors	No. of villages	%
1	Village uses imported water	143	4
2	Village requires connection to group water pipelines	386	10
3	Group water pipelines in need of reconstruction and/or construction	114	3
4	Village has decentralized of water supply system	3 206	83
	Total number of villages	3 849	100

The main problem associated with water supply in rural areas is that in most cases the solution to this issue is to be found at the national level but there is no clear division of responsibilities between different ministries. As a result, village committees are in most cases, left to fend for themselves trying to solve the problem of water supply and the solutions are often beyond their capabilities and competence.

The effect of water supply and sanitation systems availability on women; the role of NGOs and community-based groups in their management

While water scarcity is a potential threat leading to conflicts, problems of water supply and water distribution in Central Asia are still a long way away from achieving a solution. Moreover, the situation has worsened in recent years. Recent history has shown that inter-ethnic conflicts, including armed conflicts, have already taken place in the region. The distributions of lands and water resources between and within countries, as well as economic difficulties, have increased the likelihood of such conflicts in the future. In this regard, the emerging new civic institutions in the regions can play a very important role in resolving critical issues such as unemployment, creation of social harmony, community mobilization and trust building. Civil institutions are currently at the stage of formation and are mostly concentrated in the capital cities, where the donor activities are mostly carried out. Most of them are either a continuation of those organizations that were established during the Soviet era, or their creation was initiated by the elite families with powers and scope of geographical boundaries. Taking into account the fact that the concept of civil society is new to the region, these organizations lack experience and training, along with the lack of financial resources required to mobilize the community and to find solutions to local problems. Thus, non-governmental organizations (NGOs) in Central Asian countries, such as women's NGOs, deserve special attention. Women's NGOs have the potential to act as a serious alternative to the social services that are supported by the state, including issues related to water, health and sanitation sector.

Involvement of women in activities related to the provision of community water stems from their traditional role. Most often, it is women who are the users, suppliers and managers of water in the household. They are also the primary link in ensuring household hygiene. Women in Central Asia, and to lesser extent children, usually produce water for the house, deliver, store, and then use it for various household purposes. It has been documented that women who live in a region where there are acute problems with water supplies, spend one to two hours every day collecting water and this is a threat to their health. This could also lead to serious social and economic consequences for households and communities as a whole. Because women suffer the consequences of the crisis with water, they are natural agents to improve the situation with water supply and sanitation in their communities. Active involvement of women's NGOs in the management of water resources meets the practical implementation of one of the main Dublin IWRM (1992) - "Women play a central role in the provision, management and safety of water". Thus, there is need to deepen the knowledge and experience to develop a system of information exchange between practitioners of civil society institutions, government agencies, as well as external donors in Central Asia on the concept and implementation of community-based water management.

In this respect, it may be useful to present the experience of the project of the International Secretariat for Water (ISW), entitled "Water Management at the Community Level in the Fergana Valley of Kyrgyzstan and Uzbekistan: Strengthening the Role of Women." Under this project, committees were formed on water issues at the community level in order to improve water supply, health and hygiene conditions, provide loans for production and processing of food in five localities of the valley. One of these settlements is the village of Mangyt Aravanskiy district in the Osh region of Kyrgyzstan, with 380 families and a population of 1,600 people. Previously, during the former Soviet Union era, this village had plumbing and a water pipeline 7 km long. With the collapse of the Union, water provision was halted and the supply systems did not work. This has resulted in a dramatic increased incidence of viral hepatitis and typhoid in the village.

Currently, the ISW project funds rural Water User Associations and installed water pumps, providing village with water. Within the Water Users Associations 95% of the work is carried out by women. In addition the school was actively involved. Water charges were set according to the

number of children in the family and the distance from water pump. Repair of the water pumps are financed by the water tariffs. The project members of the Association have provided special courses on mechanical pump maintenance and operation. Among the members of the Association there is a representative volunteer of health hygiene. Local Sanitary-Epidemiological Service (SES) systematically examines water quality. In order to share experience and increase participation, the Water User Association organized a trip to Jordan and France for the pupils of Mangyt village school. Efficient and successful operation of such NGOs depends on primarily addressing issues of economic and legal basis for the functioning of these water committees. Moreover, experience gained from the implementation of the project in the Fergana Valley shows that for the organization of community management of water resources it is necessary to consider the following aspects of the problem (Anonymous, 2004).

1. Institutional aspects: how to decentralize the management of water resources at the community level:
   - Need for a clear division of responsibilities and tasks between the ministries responsible for water resources, technical agencies, municipalities and communities, organized in water committees;
   - Creation of the village water committees: objectives, activities, regulations and legal registration; need of technical capacity;
   - Conflict prevention mechanism: different types of conflicts in the region, conflict prevention mechanism at the basin level and at the village level, application of traditional and new forms of conflict resolution, such as township roundtables, elders' councils;

2. Social aspects: how to strengthen civil society organizations at the village level:
   - The creation and organization of NGOs and community groups (CG): existing and potential problems;
   - The role of women in society and in the management of water resources: the importance of strengthening this role;
   - The importance of social support for enlargement of family networks.

3. Economic aspects: how to get users to pay for water:
   - The price of water: the current situation and the establishment of a new fee structure for water, the need in participation of water users in decision-making, establishing the contribution of water users in the investment costs along with the costs associated with the operation and maintenance of facilities;
   - Need to strengthen income-generating activities in the field of water resources management;
   - Ownership of the water system;
   - Difficulties in the banking system.

4. The role of external donors: what type of assistance is required:
   - The need to support civil society organizations at the village level and water management projects at the village level;
   - Development of human factors to create and manage projects, and to provide content and water systems, gradual involvement of communities in the process of trust and education;
   - The ongoing process of checking the local partners involved in the implementation.

5. Regional network of practitioners: assessment of needs and interests of the participants:
   - Exchange of experience and information on various aspects of water management at the community level;
   - Organization of regular meetings and field visits (once or twice a year);
   - Interest in the development of policy deliberations regarding the management of water resources at the community level.

Water supply in urban areas of Kazakhstan: a comparison

To date, the country has a serious problem with ensuring drinking water supply in cities. According to the Agency for Construction and Housing and Communal Services (RKACHS) of the Republic of Kazakhstan as of July 1, 2010, urban population with centralized water supply makes up 72 %. This level of public access to centralized water in the Republic of Kazakhstan is lower than that in many developed countries, in which this figure is typically 90-95 %. The total length of water pipelines systems in the cities across the country is 27 000 km, including 18 173 km of distributing water networks of which 2,188 km are abandoned networks (i.e. no longer in use). According to the RKACHS the majority of water supply networks are over 25 year old and are in poor condition. Currently, 36 % of the mains of water supply network are in working

order and approximately 64% of the network requires major repair or complete replacement.

In general, the water supply networks have already been in operation for 25 - 40 years and have unprotected inner surfaces (generally steel tubes). Therefore, because of the ongoing corrosion, waterways and water networks are subject to rapid deterioration and destruction, leading to lower bandwidth pipelines, increased numbers of accidents (e.g. breaks in the pipes), losses and the deterioration of the drinking water quality. As a result, there is a recorded annual increase in the volume of losses in water supply networks. Thus, in 2009 compared to 2004 the volume of losses increased by 10.9 %. Following a 5.3% increase in the budgetary funds allocated to water sector in the Republic, the number of accidents in the water supply networks on the whole in the country decreased by 15.8 %. Currently, the lack of adequate and accurate information about the current state of urban water systems does not allow a realistic assessment of the amount of work required for the reconstruction and modernization of water supply networks in the urban areas (Petrakov, 2007, Anonymous, 2005, Anonymous, 2007, Anonymous, 2014).

Tariff policy for the water distribution systems

The water sector of both Central Asia and Kazakhstan is characterized by a high level of deterioration of water supply systems and normative technical losses, indicating the lack of investment in modernization and renewal of these sector assets. In this regard, special attention should be paid to tariffs for the services of natural water monopolies. Tariffs for water supply in previous years did not allow the water sector stakeholders to fully implement programs of repair and reconstruction, which led, ultimately, to an increase in depreciation of fixed assets. This situation in water industry has also exacerbated the problem of irrational use of water. Along with the improvement of the performance of water sector providers, raising the awareness of consumers with regard to more rational water consumption practices is a priority. Activities being explored include the establishment of consumer water meters, reduction of specific water consumption standards and the introduction of differentiated tariffs by consumer groups depending on the amount of water consumed. According to the Agency of the Republic of Kazakhstan on Regulation of Natural Monopolies, as of July 1, 2010, an average of 76 % of consumers in the cities (including domestic and industrial users) have water meters. In rural areas, the proportion of users with water meters is <40 % (Anonymous, 2014).

In general, previously the implementation of state measures aimed at providing drinking water suffered the following drawbacks:

- lack of systematic approach and proper interaction of central and local executive bodies in planning the modernization and development of water supply systems;
- lack of an integrated approach to issues of water treatment and sanitation , due to the limited water resources (open water);
- lack of monitoring of water project implementations;
- low level of construction standards for a drinking water project (JAP);
- implementation of water projects without confirmation of the availability of groundwater resources;
- incomplete accounting of water supplied to consumers;
- lack of investment resources for enterprises to modernize and reconstruct water supply systems;
- inadequate level of technical operations of the existing water supply systems.

Increasing community role in solving water and environmental problems is one of the most significant steps towards sustainable management of water resources at the local level, both in the entire region of Central Asia and in the Republic of Kazakhstan. Revitalization of the civil society in Kazakhstan began with ratification of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in environmental matters. As mentioned earlier, there is a large number of environmental non-governmental organizations whose activity is related to solution of water problems. They are engaged in public education and interact with governmental agencies on issues of management and regulation of water resources etc. Such organizations are becoming a real force that can affect regulation of water relations in river basins and regions (Petrakov, 2007; Anonymous, 2005, Anonymous, 2007; Anonymous, 2014).

Conclusion

Currently the work in this field in Kazakhstan is becoming more active and is covering a wide

range of issues including involvement of NGOs, parties, social groups and movements into the process of improving environmental situation in the regions, to the empowerment of media, Basin Councils and other public entities. NGOs regularly conduct seminars and conferences, work with the media and organize public hearings, practical landscaping, clearing rivers and canals, protection of areas of water bodies. With the establishment of Central Asian Regional Environmental Centre (CAREC) success in creating conditions for joint efforts of NGOs in the region towards improvement of environmental situation in the Aral Sea basin has been taken forward. For example, representatives of NGOs in Kazakhstan are part of the Global Water Partnership Central Asia and Caucasus (GWP CACENA) and are actively participating in programs to involve community in the integrated management of water resources in these regions.

6.4 Administrative overview and management authorities in KZ on catchment and IWCM issues

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Introduction

State administration of water sector in the Republic of Kazakhstan is represented by the Government, the authorized government agency for management and protection of water resources (hereinafter - the authorized body), local representative and executive bodies (Maslikhats, regional governors, cities, districts, villages), as well as other state bodies within their competences. The Committee for Water Resources is the department and the authorized body within the purview of the Ministry of Environmental Protection and Water Resources of the Republic of Kazakhstan that has practical and control functions in the use and protection of water resources entrusted to it by the Constitution, laws, other regulatory legal acts of the Republic of Kazakhstan (Anonymous, 2010, Anonymous, 2013). It should be noted that currently in Kazakhstan reforms in the field of water management are being actively implemented. According to the Statement of the Government of the Republic of Kazakhstan on 27.12.2013 #1413, the Committee for Water Resources of the Ministry of Environmental Protection of the Republic of Kazakhstan is renamed to be the Committee for Water Resources formed by the new Ministry of Environmental Protection and Water Resources of the Republic of Kazakhstan. In connection with this, some of key documents relating to the authorities, tasks and functions of the Committee for Water Resources and its divisions have been revised.
The content of this section has been prepared based on the current regulations and documents in the field of water resources management in the Republic of Kazakhstan.

Overview of the history of the Committee on Water Resources

In the last twelve years, the Committee for Water Resources has been subjected to six reorganization and structural changes, which has adversely affected the human and scientific potential, including preservation of the archival material base. The central apparatus of the Committee has been reduced several times and now consists of 36 people; the number of employees working for the Basin Water Economy Authority (BWEA) as more than halved, which does not allow them to solve tasks in full. Meanwhile, the number of problems and the complexity of the problems of water resources management in recent years has increased manifold.

The existing organizational structure of water management hardly solves the problem of preservation of water sources, their rational use and reproduction, which has led to the acceleration of their exhaustion, environmental situation exacerbation not only within the basin, but also throughout the country (Petrakov, 2007).

Organization of water management and its levels in Kazakhstan

State management of use and protection of water resources at the national level is the function of the authorized body – "the Committee for Water Resources of the Ministry of Environmental Protection and Water Resources of the Republic of Kazakhstan" - and its basin water management authorities. The main objectives of the Committee for Water Resources are:

- To ensure the implementation of the state policy on the use and support of water resources development programs;
- Organization of state control over the use and protection of water resources;
- Regulation of the use of water resources to meet the needs of the population and industries, to achieve and maintain an environmentally safe and economically optimal level of water use.

Table 6.4.1 Dynamics of the historic changes of the Central Apparatus of Water Resources Management in Kazakhstan (1958-2013) (Petrakov, 2007)

Year	Changes in organisational structure	Number of employees in the central office
1958	General Directorate of Water Resources (Main water industry) of the Kazakh SSR	No information
1960	Ministry of Water Resources of the Kazakh SSR	No information
1965	Ministry of Land Reclamation and Water Management of the Kazakh SSR.	179
1991	State Committee for Water Resources of the Republic of Kazakhstan.	80
1994	Water Resources Committee of the Ministry of Agriculture of the Republic of Kazakhstan.	78
1997	Water Resources Committee of the Ministry of Nature and Environment of the Republic of Kazakhstan.	31
2002	Water Resources Committee of the Ministry of Agriculture of the Republic of Kazakhstan.	34
2013	The Committee for Water Resources of the Ministry of Environmental Protection.	36
2013	The Committee for Water Resources of the Ministry of Environmental Protection and Water Resources.	No information

The structure of the Committee for Water Resources following its latest reorganization is shown in Figure 6.4.1. The Central Committee apparatus consists of:

- Management and protection of water resources;
- Reclamation management, operation and development of hydraulic structures;
- Control over group conduits and drinking water;
- Management of organizational and legal work;
- Finance management, public procurement and pooled analysis.

The Committee has regional authorities known as 'basin inspections' , which regulate the use and protection of water resources in the cities of Almaty, Astana, Atyrau, Karaganda, Kyzylorda, Kostanay, Semey and Taraz. Also, the Committee is in charge of the Republican State Enterprise responsible for the optimal economic activity of the "Kazakhstan Water Industry", with regional branches, and the Zhambyl Republican State Enterprise for Water Management "Zhambyl Water Industry".

Local representative (Maslikhats) and executive (Akimats) bodies regulate water relations at the regional level within their authority. In particular,

Maslikhats

- Establish rules of general water use on the basis of model rules approved by the authorized body;
- Approve regional programs for the rational use and protection of water bodies and monitor their implementation;
- Establish procedures to provide for the use and withdrawal of water facilities, communal property.

Akimats

- Provide management organizations for the management and maintenance of water facilities and communal property;
- Establish riparian zones and sanitary zones of protection of drinking water sources in agreement with the Basin Water Associations, territorial bodies of Geology and Subsoil Protection and sanitary and epidemiological surveillance bodies;
- Provide water bodies for separate and joint use under the agreement with the competent authority;
- Develop and implement a regional program for the rational use and protection of water bodies;
- Agree on the placement and commissioning facilities and premises affecting the condition of water, as well as the conditions of production work on the reservoirs, water

protection zones and belts, impose restrictions on the use of water resources;
- Inform the public about the status of water bodies.

The competence and basic functions of basin water controls are described in Section 6.2. Relations between the government bodies in terms of rational use and protection of waters are governed by the laws of the Republic of Kazakhstan. Kazakhstan formed a multitier system of water management complex: 1) interstate 2) state 3) basin 4) territorial, and 4) the level of water users (Anonymous, 2007; Anonymous, 2004; Anonymous, 2013; Anonymous, 2014). These levels are interconnected and perform the following tasks:

- cooperation in the field of water quality.

State

Water projects of national or regional significance are implemented at the state (national) and basin level of management. Examples of water-related activities at this level include: construction of dams, reservoirs, centralized groundwater intakes, pumping stations, control of river flow and operating modes of large reservoirs and identification of alternative sources of fresh water, as well as the minimization of losses in water supply and distribution. Management plans at these levels basically stem from actual needs and take into account the existing social and economic conditions in the river basin. Grass roots management complies with the general

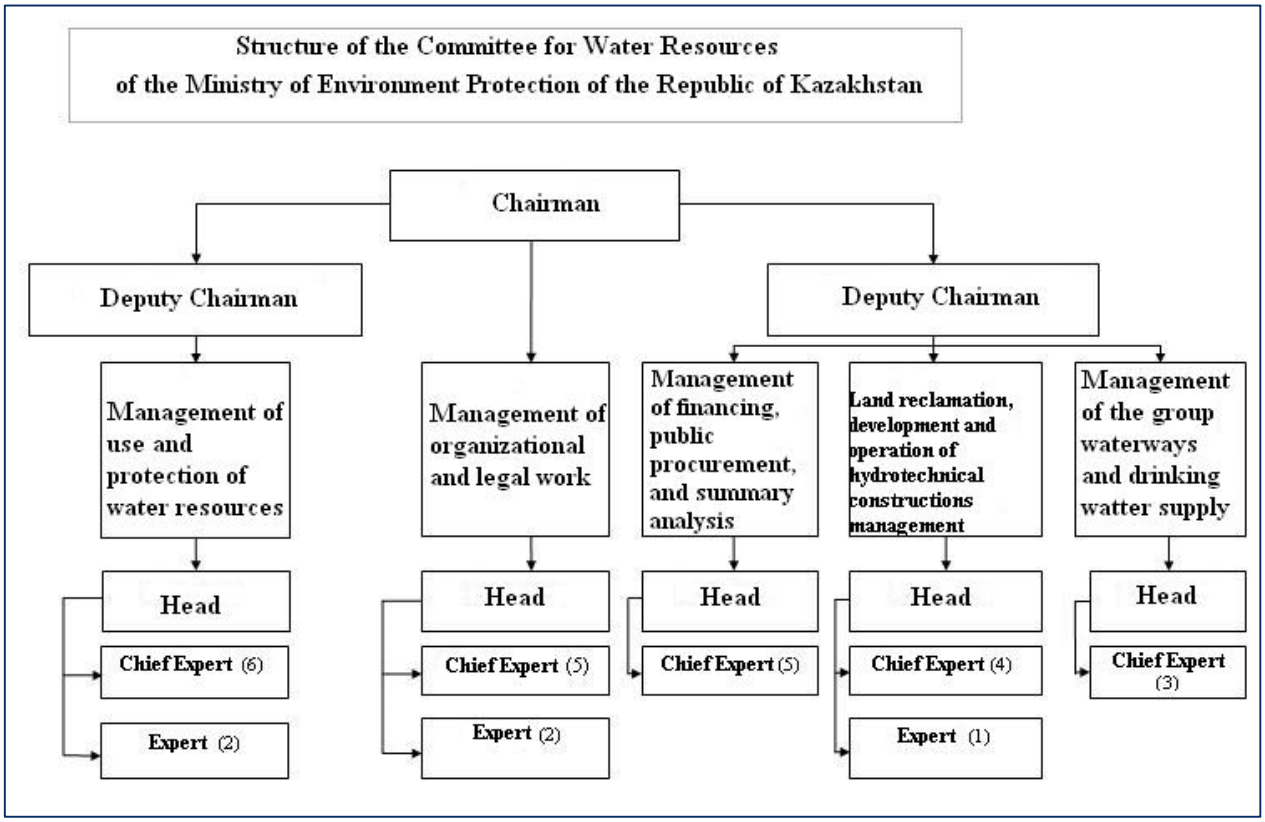

Figure 6.4.1 Structure of the Committee for Water Resources of the Republic of Kazakhstan (numbers refer to the number of employees) (Anonymous, 2013).

Interstate

At the intergovernmental level water management is achieved through cooperation in joint use and protection of transboundary water resources. At this level, the prevailing international practices must address:

- water management, reduction or prevention of adverse effects;
- prevention of the losses of water in the upper basin by reducing evaporation lossess from the water surface and land surface, where precipitation falls;

management plans, and the total water management policy is aimed at all levels of management. An optimal compromise (in relation to technical, economic and social relations) is required to be achieved between the range of water transportation to consumers and consumer approach to water sources.

Basin

Maintenance and upkeep of all water networks and facilities owned by the state is carried out at the territorial control level. This level activity is

usually aimed at reducing water losses during transportation and distribution, at ensuring the delivery of water of appropriate quality and quantity at different points in time as required, establishing direct and effective communication between central and local organizations in charge of water resources of different areas. Besides these activities, organized to improve the efficiency of water use by appropriate methods and means, the formation of cooperatives and water user associations, the interaction between water and territorial bodies authorized to distribute water resources, ensures an equitable distribution of water and its minimum losses.

Water user

At the level of water users, the main targets are: on farm irrigation and drainage networks with structures, systems and waterworks facilities (Anonymous, 2007; Anonymous, 2004; Anonymous, 2013; Anonymous, 2014).

Improving the management and implementation of IWRM in Kazakhstan

The special role of water resources within the economy, their specific characteristics and their associated limits, require a structural reform of the water sector to be implemented. This would, provide an integrated approach to water resources management, including environmental concerns. To perform these tasks creation of an adequate framework for the water sector, corresponding to each level of management is required. The Republic of Kazakhstan, as a full member of the world community, has an obligation to fulfil the tasks set out in the Agenda for the 21st Century (Rio de Janeiro, 1992) and the Declaration of the Millennium Summit (New York, 2000) as well as the World Summit on Sustainable Development (Johannesburg, 2002) and Rio +20 (Rio de Janeiro, 2012). The Republic of Kazakhstan adopted a series of measures towards sustainable development. Kazakhstan is an active member of the Commission on Sustainable Development, the UN Process "Environment for Europe" and "Environment and Sustainable Development for Asia" regional Eurasian network of the World Business Council for Sustainable Development. Development Strategy of Kazakhstan until the year 2050, the Strategy of Industrial and Innovative Development of Kazakhstan till the year 2015, the Ecological Security Concept of the Republic of Kazakhstan for 2004-2015, the Strategy of Regional Development of the Republic of Kazakhstan until the year 2015 were established by the Council for Sustainable Development of the Republic of Kazakhstan and JSC Fund “Sustainable Development "Samruk Kazyna".

Table 6.4.2 The main functions of the Committee (Anonymous, 2013)

Function	The main functions of the Committee
1	It is involved in the implementation of state policy in the field of use and protection of water resources
2	It has to prepare and implement investment projects of water facilities at the expense of the state budget, including loans and grants from international financial organizations
3	It is a working body for the development of regulations, approval of draft regulations in regulated areas, and is also involved in promotion of the Harmonization (registration) regulations within the state bodies
4	It monitors compliance with the terms and requirements of international agreements on transboundary waters
5	It carries out state registration of waters and their use, maintenance of the State Water Cadastre and monitoring of water bodies
6	It is responsible for creating an information database of water bodies and ensuring its availability to all interested parties
7	It organizes exploitation of water facilities owned by the Republic, including the design, repair, renovation, construction and maintenance, as well as ensuring their safety
8	It coordinates acceptable levels of water resources use, via forecasts, protection of water resources as part of development schemes and distribution of productive forces and industries developed by central executive bodies
9	It sets the basin water body volumes of environmental and sanitary discharges
10	It creates a national information - analytical system of water resources
11	It develops water balances
12	It takes measures to prevent, detect and eliminate violations of water related legislation of the Republic of Kazakhstan and to bring perpetrators to justice
13	It organizes the use and protection of water resources at the state control level

The data in Table 6.4.3 (Petrakov, 2007) indicate that there has been a considerable improvement in the legal framework related to the National Water

Law. This is primarily due to the fact that the state considers water resources as strategic ones and, secondly, it's a requirement of the development and implementation of programs and plans for the transition of the Republic of Kazakhstan to sustainable development.

Table 6.4.3 Development of national water legislation of the Republic of Kazakhstan

Name	On May 1st 2006	On May 1st 2009	Quantitative growth
The Constitution of the Republic of Kazakhstan			
Codes of the Republic of Kazakhstan	8	10	2
Laws of the Republic of Kazakhstan	29	32	5 (2 no longer valid)
Decrees and Addresses of the Kazakhstan President	10	15	5
Government Resolutions	78	93	15
Ministerial orders	36	63	27
International activities	10	26	16

A new system of control and regulation of water relations in the Republic of Kazakhstan has been laid down in the Water Code (2003). Practical transition to the new system of management and regulation of water relations in the country began in the year 2005 and ended in early 2007 with the introduction of elements of Integrated Water Resources Management at all administrative levels. Implemented structural reorganization of water management systems is aimed at a clear division of responsibilities at the national and local levels, and at the same time at establishment of integrated management of water resources. The fundamental principle is to create conditions for the implementation of the national policy in the field of protection and rational use of water resources. Integrated water resources management is currently the most advanced control system and is among the priorities of the International Decade for Action "Water for Life 2005-2015".

Conclusion

Apart from the above-mentioned activities, the most important results of IWRM in Kazakhstan include the following: (1) the development and implementation of the National Plan for Integrated Water Resources Management and Water Efficiency (Anonymous 2005); (2) the RK Program of Integrated Water Resources Management and Water Efficiency of Kazakhstan till 2025 and (3) the Development of the State Program on Water Resources Management in Kazakhstan for 2014-2020.

Table 6.4.4 Integral elements of the existing scheme of management and regulation of water relations in Kazakhstan with the components of IWRM

Element number	Integral elements of the existing scheme
1	Control governed by the basin principle
2	The joint planning and management of the use of water and land resources
3	Social, economic and environmental factors are integrated in the planning and management of water resources
4	Surface water and groundwater and the ecosystems through which they flow, are also integrated in the planning and management of water resources
5	Public participation is necessary for effective decision-making on water resources through efficient operation of basin councils
6	Transparency and accountability in decision-making on water management are prerequisites of good planning and management of water resources

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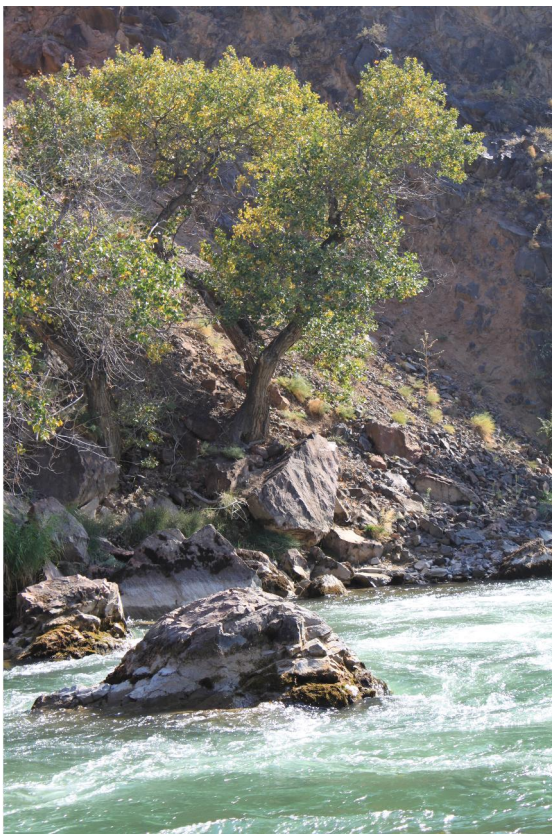

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