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Abbreviations

BC – basin council

HES – hydraulic engineering structures

HPP – hydropower plant

UNECE – UN Economic Commission for Europe

HDI – human development index

IWRM – integrated water resources management

INBO – the International Network of Basin Organisations

ICWEC – the International Coordinating Water Economy Commission

UN – the United Nations

UNDP – the United Nations Development Programme

WRA – water resources assessment

UNESCO – the UN Educational, Scientific and Cultural Organisation

UNEP – United Nations Environmental Programme

Background

It took just a few decades for water resources to be classified as a resource whose deficiency poses a serious barrier to sustainable development in many parts of the world, despite being previously seen as being inexhaustible. The depletion of the water resource potential of river systems and subsequent deterioration of water use conditions is one of the key factors of change of attitude towards water: now it is viewed as the most valuable resource of a state.

The diversity of water use types in the same river basin leads to competition for water at both a local and national level and, in the case of a transboundary river, between different countries, often becoming political in nature. For example, hydropower plants strongly affect the hydrologic behaviour of a river. Water withdrawal for irrigation, industrial and household consumption leads to the reduction of river runoff and changes in the river's hydrologic characteristics. The situation has been aggravated by the increasing contamination of water courses which receive sewage water (treated or untreated) from farms, industrial facilities, cities and rural areas.

The transboundary river and lake basins occupy nearly half of the land surface and contain 60% of the planet's freshwater.

They are shared by 145 countries inhabited by 40% of the world population. The use of transboundary water basins faces a lot of challenges including interstate water distribution, protection from water pollution and depletion. Transboundary aquifer systems are the main source of drinking water for almost 29% of the world population. (UNESCO, WWAP, 2012, UNESCO, 2013).

Transboundary rivers are not merely bodies of water: they are a focus for international politics. Natural and geographic factors determine the formation of river runoff, whereas its use is determined by political and economic factors. Efforts to secure access to water in transboundary river basins in the near and distant future shape the nature of international relations and regional security. The dynamics of use of transboundary water resources in turn influences the conditions of water use by each country in the basin, the quality and stability of a river ecosystem and, as a result, the various aspects of international relations.

The member states of the Commonwealth of Independent States (CIS) are all located within transboundary river basins, either partially or entirely, and mainly use water from surface sources. These water sources comprise runoff formed locally and inflow from neighbouring countries. The issue of water use in transboundary river basins is common to all CIS countries, with some differences dictated by natural, climatic, economic and political conditions. The increasing levels of human-caused contamination is reducing the natural pollution assimilative capacity of river ecosystems. Transboundary contamination and depletion of water resources lead to fresh water deficiency, thus creating potential risks to sustainable development. Maintaining permissible levels of water withdrawal and river ecosystems transformation and achieving an optimum combination of direct and indirect positive effects associated with the construction and operation of hydraulic, irrigation and hydropower facilities are the key issues of international cooperation in transboundary river basins. Therefore, transboundary resources management requires coordination and integration of political approaches, innovative solutions and a switch from unilateral efforts to multilateral cooperation.

The modern water policy of the countries in question is based on the split of water resources management and water economy management functions. These activities are closely related

but have different tasks. In the past they were viewed as a single function and were the domain of the land reclamation and water economy sectors (the main water consuming sectors). The transition to a market economy and economic decentralisation in the countries in question led to the split of public functions relating to the regulation of water use and protection of water resources from functions relating to water supply to the population and various industries.

As per the constitutions of the CIS countries, the exclusive powers of the state include the management of natural resources including water resources, and, as a consequence of this, water resources management is an important public function. Water economy reforms in these countries include the assignment of water facilities to collective and private owners, thus creating a services market in the water sector.

Sustainable development is hindered by the increasing contamination of the environment, in particular, water resources. This problem is aggravated by the large–scale application of agrochemicals such as pesticides and household detergents and inadequate treatment of industrial and urban wastewater. Contamination of water sources reduces the safety of water use and has a grave effect on river ecosystems.

Water demand management, control of water consumption and the preservation and rehabilitation of quality of water are all given priority in the package of water economy measures. The issue of water supply to the population and various sectors will be addressed by limiting water consumption and water conservation techniques, primarily in agriculture and industry. Efficient water resources management is a prerequisite to sustainable water use and to this end all countries have national administrative bodies that carry out the state water management policy.

To address water shortages, the diversion of runoff is carried out and reservoirs and other hydraulic structures are built in river basins. The scale of these measures is so extensive that in almost all the countries river runoff is now fully regulated and river basins form a controlled water economy and water resource system.

Interaction between water management bodies and the various economic sectors, i.e. water users and consumers is the basis of integrated water resources management. Water economy management itself requires a corporate approach towards the organisation of water use and application of market mechanisms. It should be emphasised that an integrated system of water resources management in still under development in the CIS countries, and the legal aspect of this process calls for integration with many branches of law relating to environmental protection, economy, finance, construction, education, science, international relations and international security.

The issues of water resources management have specific features in each country in the region. However, the historic humanitarian, economic and political ties between the CIS member states provide a basis for cooperation and for the efficient solution of transboundary water issues in the new geopolitical environment. The rapprochement of CIS countries in the legal and economic aspects of regional cooperation and transboundary watercourses requires an ongoing political dialogue, which should be based on the international laws that apply in this context and on the past experience of bilateral and multilateral cooperation. National water policy should be tailored to strengthening regional cooperation. It is envisaged that each country will make a contribution to the maintenance of environmental security of river ecosystems and rehabilitation and preservation of the water resource potential of river basins.

Enhanced interaction between the CIS countries in the joint use of transboundary watercourses will allow concerted regional and national water use policies to be pursued covering the various aspects of water economy: water supply, irrigation, hydropower, water transport, etc. Strengthening cooperation, particularly on a multilateral basis, will promote sustainable water use, security of water bodies and hydraulic facilities and the preservation of the environmental potential of river basins.

The special role water resources play in the economy warrants implementing a consistent water conservation policy aimed at the preservation of water sources potential and providing the population and economic sectors with the required quantities of quality water, while also addressing environmental problems in transboundary river basins.

Sustainable water use means practices that enable an optimum supply that meets the needs of the population and various industries without a negative impact on river ecosystems. This is a challenging task: on the one hand, one should take account of any natural factors which lead to uneven territorial distribution of water resources, seasonal runoff fluctuations and the effects of climate change and on the other hand, any anthropogenic factors such as the scale of water use, on-going increases in the consumption and contamination of water sources.

Water supply, irrigation, hydropower, environmental protection and stability of river ecosystems all require a sound water management system. The basic unit for this is a river basin, i.e. a single geographic region within which comprehensive use and protection of water resources can be maintained with due regard for social, economic and environmental conditions. This basin-based principle of integrated river system management is being prioritised in international cooperation between the CIS countries. Importantly, integrated water resources management envisages such forms of interaction that reflect the common interests of all stakeholders and promote mutual integration of the river basin's economies and solution of water and environmental problems. Integrated management of transboundary watercourses is first of all a form of political cooperation and shared responsibility and it becomes increasingly important. As modern water resources policy comprises one fifth the resources management itself and four fifths human resources management, the efficiency of integrated management in this field is principally dependent on the human factor – that is, the expertise and professional training of decision-makers.

Joint management of environmental and resource problems in transboundary river basins, implementation of multilateral investment projects, R & D activities and personnel training will become the keys to the sustainable development and integration of CIS countries. The prerequisites to this are already there: water resources management and water economy management (research, design, construction and operation) in these countries are based on common standards. This enables the stakeholders to develop unified approaches towards similar problems they face in water resources management and related economic sectors and, as importantly, creates conditions for cooperation in developing new standards and methodology. In addition, the implementation of joint projects to develop common terms of reference and requirements allows the cost of construction and operation of hydraulic facilities to be reduced and their reliability to be enhanced. The economic development of the CIS countries and the growing demand for water and the need to address environmental issues in transboundary river basins make this interaction even more important. Equal and mutually beneficial cooperation is a fundamental premise of joint water use by countries located in a transboundary river basin. Agreeing the conditions and rules of operation of hydropower plants (HPP), reservoirs, main canals, large pump stations and plans to construct facilities for using and protecting transboundary water resources requires concerted efforts based on integrated water resources management. Water user countries must adhere to the principles of responsible and fair use of international watercourses and non-infringement of the interests of the others.

1. Socioeconomic priorities of development and integration of CIS countries

1.1. Summary of the natural resources and economic potential of CIS countries

The Commonwealth of Independent States is a regional international organisation created to regulate cooperation between the former member states of the Union of Soviet Socialist Republics (USSR). The CIS was founded in December 1991 and now comprises Azerbaijan, Armenia, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Uzbekistan and Ukraine. In August 2005 Turkmenistan ceased to be full member and acquired the status of an associate observer. Georgia was a member of the CIS from December 1993 to 18 August 2009. In the Almaty Declaration the members expressed their intention to cooperate on the basis of sovereign equality (CIS, 1991).

Figure 1.1.
Map of the Commonwealth of Independent States

Source: CIS Statistics Committee. www.cisstat.org

The CIS is one of the largest regional economic groupings accounting for 16.4% of the world's area and 4.4% of the world's population. Its member states possess vast natural resources and economic potential sufficient to secure the sustainable development of national economies. Generally they are world leaders in terms of explored reserves of gas, oil, coal, iron, manganese, non–ferrous metals, potassium salts and other essential minerals. The CIS possesses 20% of the world reserves of oil, 40% of natural gas, 25% of coal, 10% of power generation, 25% of wood, 11% of renewable water resources and 13% of arable land. The mineral resources of CIS countries include practically all minerals. The production, processing and export of minerals are the mainstay of most CIS economies.

The national economies of CIS members have gone through dramatic changes. They finally switched from a planned economy to a market economy, implemented administrative reforms and introduced a wide range of credit and monetary instruments; they actively pursue

integration into the global economy and have become increasingly dependent on the globalisation processes.

Orientation towards external markets is mostly typical of those CIS countries that possess valuable raw material resources. Production of fossil fuel and metal goods are on the increase practically in all CIS countries, whereas the share of processing industries has shrunk. The energy, transport and communications systems of CIS countries are playing an increasingly important role on global energy and transport markets, as globalisation changes the proportion of internal and external driving forces of their national economies. Integration into the global economy leads to changes in the production structure and, accordingly, water use priorities (Boikova, Krupnikova, 2010: 4–17).

Table 1.1.
Summary of CIS member states

Source: CIS Statistics Committee. www.cisstat.com

Country	Borders:	Area		Permanent population (in millions of people, as of the beginning of 2013)		Population density (per 1 km^2)
		'000 km^2	% of CIS	total	% of CIS	
Azerbaijan	Armenia, Georgia, Russia, Iran, Turkey	86.6	0.39	9.3	3.3	107.4
Armenia	Georgia, Azerbaijan, Iran, Turkey	29.8	0.14	3.3	1.2	110.7
Belarus	Latvia, Lithuania, Poland, Russia, Ukraine	207.6	0.94	9.5	3.4	45.8
Kazakhstan	China, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan	2,724.9	12.35	16.9	5.9	6.2
Kyrgyzstan	China, Kazakhstan, Tajikistan, Uzbekistan	199.9	0.91	5.6	2.1	28
Moldova	Romania, Ukraine	33.8	0.15	3.6	1.3	106.5
Russia	Azerbaijan, Belarus, Georgia, Kazakhstan, China, North Korea, Latvia, Lithuania, Mongolia, Norway, Poland, the USA, Ukraine, Finland, Estonia, Japan	17,098.2	77.48	143.3	50.9	
Tajikistan	Afghanistan, China, Kyrgyzstan, Uzbekistan	143.1	0.65	7.9	2.8	55.2
Turkmenistan	Afghanistan, China, Kyrgyzstan, Uzbekistan	491.2	2.23	6.7	2.4	13.6
Uzbekistan	Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Afghanistan	448.9	2.03	29.9	10.6	66.6
Ukraine	Poland, Slovakia, Hungary, Romania, Moldova, Russia, Belarus	603.5	2.73	45.4	16.1	75.2
All countries		22,067.5	100	281.4	100	12.7

By making efficient use of a combination of internal and external opportunities, including mutually beneficial cooperation, CIS countries can boost their economic development and strengthen their positions globally.

The basic document aimed at finding mutually satisfactory solutions to a wide range of economic problems is the Strategy of Economic Development of the Commonwealth of Independent States for the Period until 2020. It describes a system of CIS members' agreed views on their common goals, sets priorities and outlines the prospects for future socioeconomic development. These are, in order of priority, trade, fuel & energy, agribusiness, transport and innovations. Particular provisions of the Strategy are being implemented within the framework of separate programmes which reflect the specific conditions existing at each stage (CIS, 2012).

The economic policy of the CIS in the next few years will be aimed at developing domestic markets, protecting domestic producers and consumers, and making fuller use of existing and newly constructed production facilities. To this end, it will be necessary to harmonise the national legal and economic frameworks for the activities of market players and apply unified technical and environmental standards. It is envisaged that competitive advantages in energy, transport,

agribusiness and processing of natural resources will be realised and developed and institutional conditions will be created for systemic switch to innovative development of the economy at the next stage.

The Strategy provides for the following measures aimed at building an environmentally–responsible economy:

- creating a system of economic mechanisms of natural resources management and environmental protection, introducing environmental payments, developing a financial credit system for environmental protection, stimulating a market for environmental services, products, technology and equipment;
- implementing innovative projects, energy–efficient and resource–saving technologies, low–waste, zero–waste and environmentally friendly industrial processes;
- introducing economic liability on natural resource users for contamination of the environment;
- conducting joint studies in order to record any on–going changes and forecast their consequences;
- creating systems for the protection of water resources and improving the quality of drinking water;
- developing research–backed environmental standards (maximum permissible concentrations of pollutants and physical factors of equipment affecting human health) and substantiating requirements for environmental safety of products;
- cooperating in the design, production and mutual supplies of environmental protection equipment and individual protection equipment for the monitoring, prevention and mitigation of natural and man–caused emergencies; and
- joining together efforts and resources for implementing priority international educational and R & D measures in the fields of efficient use of natural resources and prevention of environmental contamination and natural and man–caused emergencies (CIS, 2012).

1.2. The status and prospects of sustainable use and protection of water resources in the CIS

The goals and tasks of the Strategy are closely related to the supply of water needs of various economic sectors, improvement of access to quality drinking water and the solution of environmental problems in river basins. Therefore, improvement of water resources management and efficient use and protection of water resources become primary concerns.

The CIS ranks first in the world in terms of the number of lakes (over 2.85 million) and lake water reserves. Of special importance to the economy are the fresh–water lakes.

Table 1.2. CIS lakes and their surface area

Source: Satunkin, Sobolin, 2006: 120

Note: *not including the Caspian and the Aral

Surface area (km^2)	Number of lakes				Total surface area ('000 km^2)			
	Europe	Siberia and Far East	Central Asia*	Total	Europe	Siberia and Far East	Central Asia	Total
Less than 1	535,411	2,247,165	32,151	2,814,727	21.5	136.5	1.5	159.5
1–10	5,852	30,534	510	36,896	15.5	70.1	1.4	87
10–50	581	1,480	63	2,124	10.1	28.4	1.4	39.9
50–100	74	150	10	234	5.1	10.1	0.8	16
Over 100	75	96	14	185	78.3	77.4	30.3	186
Total	541,993	2,279,425	32,748	2,854,166	130.5	322.5	35.4	488.4

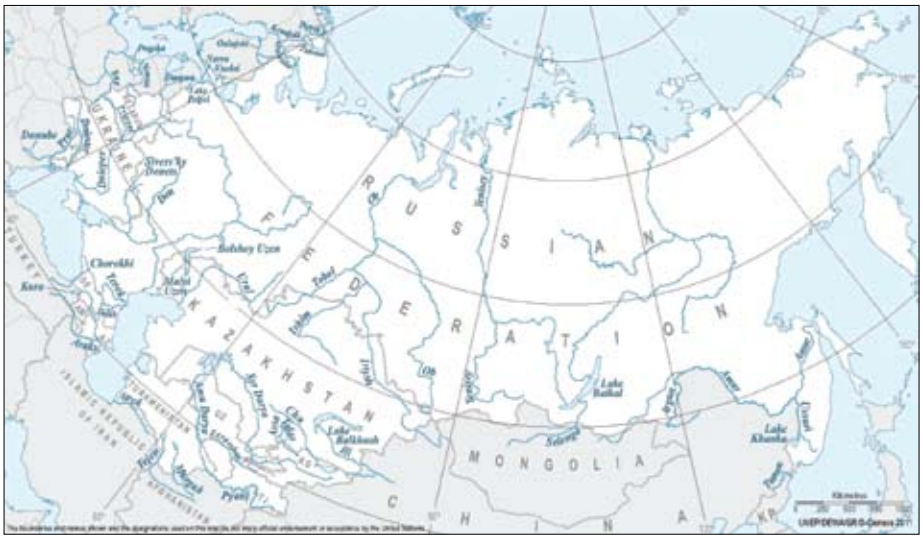

Figure 1.2.
Map of the main surface water bodies in the CIS

Source: UNECE, 2011: 18

Name	Surface area (km²)	Depth (m)		Volume (km³)
		Average	maximum	
Caspian[1]	395,000	190	980	76,040
Aral[1]	63,400	16	68	1,023
Baikal	31,500	730	1,741	23,000
Balkhash[2]	18,300	6.1	26	112
Ladozhskoye	17,700	5.1	230	908
Onezhskoye	9,720	29	127	285
Issyk–Kul[2]	6,280	279	702	1,730
Zaisan	5,510	9.6	–	53
Taimyr	4,560	2.8	26	13
Khanka	4,150	4	10.6	16.5
Chudsko–Pskovskoye	3,550	7.1	15	25.2
Alakol	2,650	22.1	54	58.6
Chany	1,990	2.2	9	4.3
Tengiz	1,590	7	8	11
Sevan	1,360	43.2	86	58.5
Beloe	1,290	4.5	20	5.2
Vygozero	1,140	6.2	18	7.2
Topozero	1,049	14.8	56	15.7
Total	–	–	–	103,366.2
Including fresh water	–	–	–	24,461

Table 1.3.
CIS lakes (with an area exceeding 1,000 km²)

Source: Satunkin, Sobolin, 2006:120

Note: [1] – prior level recession; [2] – Lake Balkhash is fresh in the west and saline in the east; Caspian, Aral, Issyk–Kul and Alakol are saline

The statistical water reserves of 18 CIS' large lakes total 103,366.2 km³, of which 24,461 km³ is fresh water, including 23,000 km³ in Lake Baikal (94%). Fresh–water reserves of the other lakes do not exceed 3,000 km³; thus, the statistical fresh–water reserves total 27,500 km³.

Some regions of the CIS have extensive glaciers with a total area of 78,000 km², according to the Catalogue of Glaciers of the USSR. Over 3/4 of this area is made up by inland ice of arctic islands. Mountain and valley glaciation is pronounced in the mountain ranges of Central Asia, the Caucasus, the Polar Urals, the Altai, the Sayans and Kamchatka. The glaciers of Central

Table 1.4.
Summary and assessment of river runoff in CIS countries

Country	River runoff, annual average				CIS' water adequacy per capita, annual average				CIS' water adequacy per km², annual average			
	locally formed		Total		local water resources		Total		local water resources		total	
	km³	%	km³	%	'000 m³	position	'000 m³	position	'000 m³	position	'000 m³	position
Azerbaijan	10.3	0.24	30.9	0.65	1.11	8	3.33	7	118.9	6	356.8	2
Armenia	6.26	0.14	7.2	0.15	1.9	6	2.18	9	210	4	241.6	6
Belarus	34.1	0.79	57.9	1.2	3.59	4	6.1	5	164.2	5	278.9	3
Kazakhstan	56.5	1.3	100.5	2.1	3.34	5	5.95	4	20.7	10	36.8	11
Kyrgyzstan	50	1.15	50	1.05	8.93	2	8.93	2	251.2	2	251.2	4
Moldova	1	0.02	7.3	0.15	0.28	10	2.03	10	29.6	8	216	7
Russia	4,043	93.49	4 262	89.64	28	1	29.74	1	236.5	3	249.3	5
Tajikistan	58.9	1.36	64	1.35	7.46	3	8.1	3	411.6	1	447.2	1
Turkmenistan	1.41	0.03	23.94	0.5	0.21	11	3.57	6	2.9	11	48.7	10
Uzbekistan	9.5	0.22	63.02	1.32	0.32	9	2.11	8	21.2	9	140.4	9

Source: CIS Statistics Committee, 2006

Asia are of the greatest economic importance, as they contain over 1,400 km^3 of water. An average volume of renewable water resources (river runoff) in the CIS is estimated at 4,754.46 km^3 per annum, of which 4,414 km^3 or 92.8% is formed locally. Russia receives about 90% of this runoff.

Due to climatic and geographical conditions, the distribution of water resources over the CIS territory is extremely uneven. In southern regions with inland drainage where water needs are especially great, only 10% of the CIS' total is formed (about 470 km^3 per annum).

River runoff in Central Asia is fed mainly by glaciers and is used for irrigation and power generation. Importantly, periods of intensive glacier melting coincide with vegetation periods, i.e. the time when crops require water most (April–May; June–July), thus creating favourable conditions for irrigated farming.

In terms of water availability the CIS' territory can be divided into three zones:

- high water availability zone with a specific discharge M_0 > 6 l/sec per km^2 (northern, northwestern, eastern and mountainous regions), covering about half of the area in question and holding 80% of its water resources;
- medium water availability zone (M_0 = 2–6 l/sec per km^2), covering less than 25% of the CIS' territory and 18% of water resources; and
- low water availability zone (M_0 < 2 l/sec per km^2), covering 27% of the CIS' territory and 2% of water resources (Satunkin, Sobolin, 2006:120).

In most densely populated areas where about 80% of the population, 80% of industrial production and about 90% of farm land of the CIS is concentrated, available water resources account for 24% of the CIS' total. In arid areas covering 27% of the CIS' territory water resources account for as little as 2% of the total. In dry years water availability drops by 1.5–2 times and countries with larger portions of transboundary river runoff face the risk of considerable shrinkage of water inflow from neighbouring countries. The specific availability supply figures shown in *Table 1.4* refer to natural water resources. As a result of economic activities, heavy contamination of water bodies and climate change most CIS countries face the steady trend towards the reduction of river runoff and deterioration of its quality.

Per capita water availability in the CIS, according to 2012 data, was 17,010 m^3/year; the highest level was recorded in Russia (29,740) and the lowest in Moldova (2,030) and Ukraine (1,930). The lowest availability of locally formed river runoff was recorded in Uzbekistan, Moldova and Turkmenistan: 320, 280 and 210 m^3/year, respectively.

In terms of territorial availability supply from all water sources including transboundary river runoff CIS countries rank as follows: Tajikistan (447,200 m^3/km^2), Azerbaijan (356,800), Belarus (278,900), Kyrgyzstan (251,200), Russia (249,300), Armenia (241,600), Moldova (216,000), Ukraine (145,300), Uzbekistan (140,400), Turkmenistan (48,700), Kazakhstan (36,800).

According to international classification, regions possessing less than 500 m^3 of water per person a year fall into the "absolute scarcity" category; possession of 500–1,000 m^3 indicates "scarcity", 1,000–1,700 m^3 – "stress", and over 1,700 m^3 – "no stress" (Falkenmark, Widsrand, 1992: 1–36).

Unit (1 m^3 per person)	Category
> 1,700	No stress
1,000–1,700	Stress
500–1,000	Scarcity
< 500	Absolute scarcity

Table 1.5.
Water adequacy categories

Source: Falkenmark, Widsrand, 1992: 1–36

According to the above classification, the absolute scarcity category (taking into account locally formed water resources and excluding transboundary river inflow) includes Turkmenistan (210 m^3 per capita), Moldova (280) and Uzbekistan (320). Azerbaijan (1,110), Ukraine (1,180) and to some extent Armenia (1,900) can be viewed as water stressed countries. The "no stress" category includes Russia (28,000), Kyrgyzstan (8,930), Tajikistan (7,460), Belarus (3,590) and Kazakhstan (3340). Taking into account their considerable transboundary inflow, Ukraine (1,930 m^3 per capita), Moldova (2,030), Uzbekistan (2,110), Armenia (2,180), Azerbaijan (3,330) and Turkmenistan (3,570) can also be classed as "no stress" countries. The southern part of Kazakhstan, despite the country's generally good water availability, is strongly dependent on transboundary inflows.

The levels of water availability of CIS member countries, bearing in mind the importance of transboundary runoff and the large areas covered by transboundary river basins, warrant further efforts to broaden international cooperation in efficient use and protection of water resources.

Apart from surface water, natural and useful groundwater resources are also used for industrial purposes and drinking. "Natural groundwater resources" means a portion of underground water resources which is renewed annually (1,140 km^3). "Useful groundwater resources" means a portion of underground water resources which can be withdrawn from the aquifer without affecting its yield or water quality (325 km^3). Natural groundwater resources make up about 1/4 of annual river runoff and are distributed unevenly across the CIS: 28% is concentrated in Europe and 72% in Asia. Natural fresh-water reserves contained in sedimentary strata to the depth of 200 m are estimated at 2,000–3,000 km^3.

Cooperation of CIS countries located in transboundary basins must be based on the provisions of international law pertaining to particular conditions of joint use of water resources. Bearing in mind the geographic isolation of some regions of the CIS and transboundary river basins, the dynamics of demographic processes becomes one of the key factors that determine the nature of international water use and international relations generally.

Table 1.6.
The area of CIS countries lying in international river basins (%)

Source: www.cawater-info.net/twinbasinxn

Country	International basins	% of countries' area lying in international river basins
Armenia	Kura-Araks	100
Azerbaijan	Astara Chai, Kura-Araks, Samur, Sulak	70.34
Belarus	Daugava, Dnepr, Narva, Neman, Vistula, Volga	95.7
Kazakhstan	Aral, Ili/Kyunes Khe, Ob, Ural, Poo-Lung-Toh, Tarim, Volga	64.03
Kyrgyzstan	Aral, Ili/Kyunes, Tarim	85.59
Moldova	Danube, Dnestr, Kogilnik, Sarata	100
Russia	Amur, Daugava, Dnepr, Don, Yelanchik, Haar Us Nur, Yacobs, Kemi, Kura-Araks, Ubsa-Nur, Lava-Pregel, Mius, Narva, Neman, Olanga, Ob, Ural, Oulu, Pasvik, Prokhladnaya, Poo-Lung-Toh, Samur, Suifun, Sulak, Terek, Tuloma, Tyumen, Volga, Vuoksa, Yenisei	47.02
Tajikistan	Aral, Tarim	9.85
Turkmenistan	Aral, Atrak, Gari/Gerirud, Murgab	11.23
Ukraine	Danube, Dnepr, Dnestr, Don, Yelanchik, Kogilnik, Mius, Sarata, Vistula	75.79
Uzbekistan	Aral	53.11

The CIS has 4,000 reservoirs, each with a capacity exceeding 1,000,000 m^3. Their full capacity totals 1,137 km^3, or 15% of the total capacity of all world's reservoirs. Their useful capacity is 587 km^3, or 11% of that of all world's reservoirs. Over 90% of the said useful capacity is held in reservoirs whose capacity exceeds 100 million m^3.

The total runoff being retained by CIS' reservoirs is estimated at 1,137 km^3, and the share of ground water runoff increased by 1.5 times. The largest reservoirs are Bratskoye (in terms of capacity, 169 km^3) and Volgogradskoye (in terms of surface area, 6,450 km^3). In Central Asia, the largest reservoir is Toktogulskoye (19 km^3).

The latest statistics of the world's largest reservoirs (Avakyan, 1990) are as follows: there are over 30,000 reservoirs with a total capacity of about 6,000 km^3, which exceeds the total volume of water contained in river basins by 2.8 times (2,130 km^3), and their total useful capacity (3,000 km^3) is sufficient for increasing the sustainable river runoff of all dry land (12,000 km^3) by 25%. The US has the biggest number of dams (over 5,500); of this figure, over 700 have a full capacity in excess of 100 million m^3 each.

	1991	1995	2000	2005	2006	2007	2008	2009	2010	2011
Azerbaijan	16.5	14	11.1	12	12.4	12.3	11.7	11.4	11.6	11.8
Armenia	3.7	2.5	1.9	2.3	2.8	3	2.9	2.5	2.1	2.4
Belarus	2.9	2	1.8	1.7	1.7	1.6	1.6	1.5	1.5	1.6
Kazakhstan	34.9	28.8	19.8	24.8	21.2	22.8	20.5	21.5	23.8	21.9
Kyrgyzstan	11.1	9.3	8	7.9	8	8.5	8.5	7.6	7.5	7.5
Moldova	3.1	2	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Russia	107.5	86.6	75.9	69.3	70.1	69.6	69.5	64.7	72.6	72.8
Tajikistan	13.7	11.1	10.7	10.5	10.4	10.6	10.8	10.9	11	11
Turkmenistan	26.8	25	24.2	24.6	24.8	24.6	24.7	24.8	24.9	25
Uzbekistan	69.9	55	49	60	59.9	60.1	60.1	59.9	59.9	60
Ukraine	27.2	19.1	13.3	9.9	10.1	10.6	10.1	9.2	9.5	9.6

Table 1.7.
The dynamic of water withdrawal from natural sources in CIS countries (km^3 per year)

Source: CIS Statistics Committee, 2012: 44

In international practice, the socioeconomic development of a country is assessed using the so–called human development index (HDI); the maximum value of HDI is 1. According to a methodology proposed by the UNDP, HDI aggregates various indices such as life expectancy, education and living standards within respective tolerance regions. A HDI value shows how a country is far from, or close to the targets of 85–year life expectancy, universal access to education and adequate income levels. In order to compare the socioeconomic development of different countries according to HDI, since 1990 the UNDP annually publishes its human development reports which contain a global HDI rating and other related social indices. Countries' development levels are categorised by HDI as very high, high, medium or low. Thus, in the 2013 Human Development Report, The Rise of the South: Human Progress in a Diverse World, according to the 2012 rating of 187 countries and territories, the leaders are Norway (0.955[1]), Australia (0.938) and the US (0.937), and the outsiders are Mozambique (0.327), Congo (0.304) and Niger (0.304).

Due to the high levels of social development, including health, education and life expectancy achieved during the Soviet period, CIS countries still retain

[1] HDI values are given in brackets.

satisfactory positions in terms of human development. In global HDI ratings Belarus, Russia, Kazakhstan, Ukraine, Azerbaijan and Armenia belong to the high HDI group and the remaining CIS countries to the medium HDI group.

HDI closely correlates with population's access to safe drinking water and sanitation services. CIS countries' performance at this end varies considerably, hence differences in their positions in global HDI ratings. Belarus has one of the best HDI ratings among CIS countries (0.793 in 2012), which is largely attributable to the reliable operation of its water supply infrastructure. In CIS countries with low HDI ratings population's access to centralised water supply is limited. HDI, being an integrated indicator of a country's socioeconomic development, allows the priorities of national policies aimed at improving access to quality water supply and sewage services to be defined.

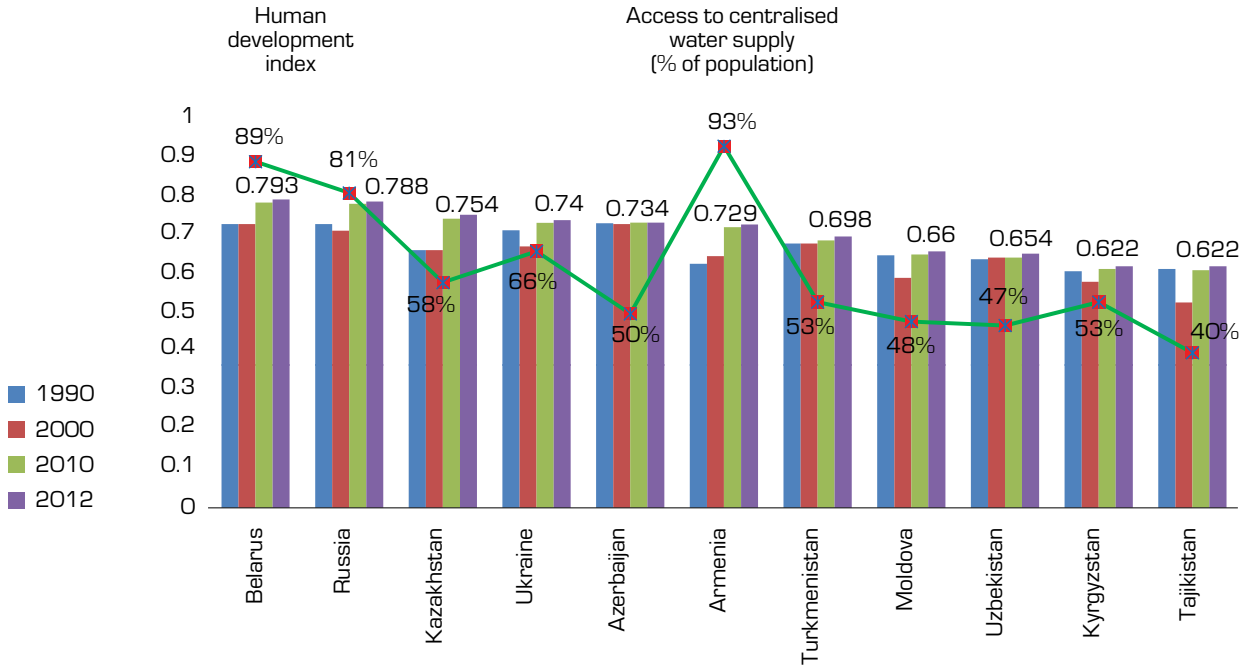

Figure 1.3. Trends in HDI and population's access to centralised water supply in CIS countries

Source: UNDP, 2013; UNICEF, WHO, 2012: 38–55

In large cities in the CIS most people can obtain centralised water supply and sanitation services. The rural population tends to use drinking water from local systems. Throughout the Soviet period new water supply systems were built on a large scale all over the CIS. However, in the last 10–15 years the building, reconstruction and modernisation of such systems stopped practically in all CIS countries due to a lack of funds. There were dramatic cuts in allocations for the maintenance of urban and rural water supply systems. The condition of rural systems is particularly poor, hence poor indices for the population's access to drinking water and sanitation services. In the last few years, programmes of construction and capital repairs of water supply systems have started to be implemented in an effort to enhance access to safe drinking water and disease control and prevention, especially in rural areas.

Most water supply systems in the CIS are made of steel and cast iron pipes – nearly 90%. These pipes are worn out by 30–40% or even more, resulting in high accident rates, poor reliability of water supply and water quality. For example, in Ukraine 29,300 km or 30% of all water pipelines is unsafe. One fourth of all waterworks and networks (in value terms) and every fifth pump station are totally depreciated. The poor technical condition of Ukraine's urban

water networks results in the loss of up to 30% of supplied drinking water. The loss of such a volume means that over 1.1 billion kWh of electric power, 7,000 tonnes of liquid chlorine, over 20,000 of coagulators, etc. are wasted as well. Generally, transport of water through water mains is a major concern in energy saving. The narrowing of the inner diameter of pipes reduces their throughput capacity, which results in excessive power consumption for water transport (Petrosov, 2007). The design of the CIS' water networks is highly metal–intensive, and the replacement of old steel pipes with non–metal ones will allow the service life and reliability of the existing systems to be enhanced.

The water users' structure largely determines the prevailing water uses in a particular region. For example, in Central Asia, North Caucasus and Transcaucasia the main components of the water economy are hydropower and irrigation facilities. In the south of the European part of the CIS, the main water uses are irrigation and industrial and household consumption; in central and northern regions of the CIS and the Far East – hydropower and water transport and in Siberia – hydropower, water transport and timber rafting. Water transport has a relatively big share only in Russia, where it accounted for about 5% of total cargo in 2011.

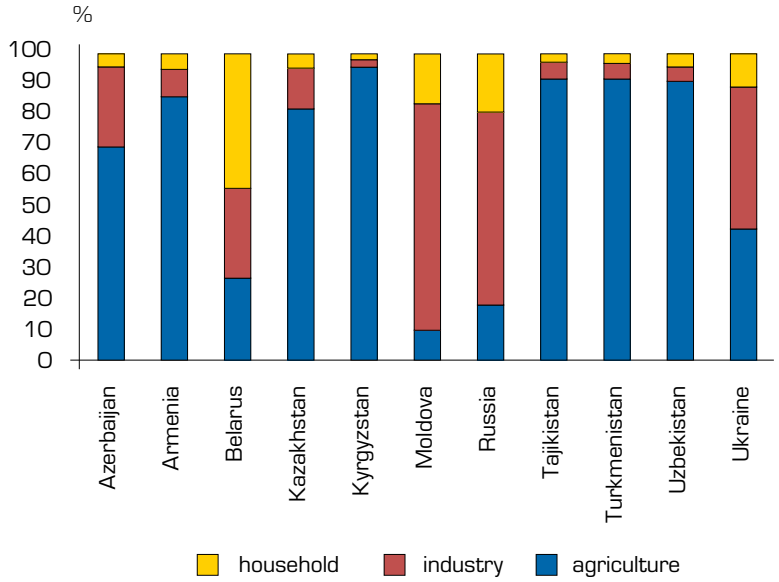

Figure 1.4.
Water use structure in CIS countries (2010–2012)

Source: CIS Statistics Committee, 2012; national statistics agencies of CIS member states

The principal water user in the CIS is the agriculture sector, particularly, irrigated farming. It accounts for 60–70% of all water withdrawal from natural sources (up to 84% in Central Asia).

Irrigation systems are very capital–intensive and may account for 60–70% of the book value of a farm. These systems are generally now in poor technical condition in the CIS countries; their service life has long expired and physical wear is far ahead of reconstruction work. As a result, the operation reliability is low and water losses are dramatic. Notably, the structure of fixed assets related to land reclamation varies from one CIS country to another. For example, in Russia this structure is dominated by facilities for the drying–out of wetland, pump stations and water mains for irrigating arid areas, whereas in Central Asia fixed assets consist primarily of irrigation and drainage networks and pump stations which lift water to mountainous areas.

During the implementation of an intensive land reclamation programme (1970–1990) irrigated and dried–out land increased dramatically in the former Soviet republics. For example, irrigated areas increased from 1.9 to 6.1 million ha.

Since 1991 irrigated areas have shrunk rapidly all over the CIS.

Table 1.8.
Reclaimed land and sources of irrigation

Sources: FAO, 1997: 30–38; Lopukhov, Kireicheva, 2011: 2–9; RRIA, 2009: 72; CSTI, 2010: 53–59

Country	Reclaimed areas ('000 ha)		Sources of irrigation ('000 ha)					
	irrigated	dried–out	surface water	%	ground water	%	others	%
Azerbaijan	1,453.3		1,356.6	93.3	96.7	6.7		
Armenia	285.7		251	87.9	34.7	12.1		
Belarus	0.4	3,300	0.4	100				
Kazakhstan	2,313.1		2,089	90.3	179	7.7		
Kyrgyzstan	1,077.1		1,070.1	99.4	7	0.6		
Moldova	245.6		245.6	100				
Russia	4,269.9	4,788	4,269.9	100				
Tajikistan	719.2		626.2	87.1	68	9.5	25	3.5
Turkmenistan	1,744.1		1,700.5	97.5	43.6	2.5		
Uzbekistan	4,280.6		4,006.1	93.6	274.5	6.4		
Ukraine	2,181	3,307	2,181	100				

The water economy infrastructure built during the Soviet period has been in service for a very long time, and now needs capital repairs and modernisation. In order to maintain its operating reliability and improve the condition of irrigated areas it will be necessary to materially increase financing and encourage investments in the water and agriculture sectors. For example, the service life of irrigation and drainage networks in Central Asia (some 330,000 and 85,000 km, respectively) is nearing its endpoint, and physical wear of hydraulic and land reclamation facilities averages 80–85%. The condition of 30–40% of irrigated land requires improvement. In the next 2–3 years, rehabilitation of irrigation and drainage networks in Central Asia will require about $10 billion. According to the UNDP regional bureau, due to the lax agronomic requirements and poor condition of irrigation systems, annual economic losses amount to $1.75 billion. According to Kazakhstan's 3rd national report on implementation of the UN Convention to Combat Desertification, the country's losses are estimated at $6.2 billion a year, and in the context of the entire region this figure may be several times higher.

Insufficient water supply for irrigated farming is largely attributable to unsatisfactory management of irrigation systems, which results in material losses in the agriculture sector. Up to 50% of water is lost due to filtration and leakages in irrigation networks. Salinisation and water–logging seriously reduce crop productivity and withdraw large tracks of land from agriculture, which in turn affects livestock, cereals and vegetables production.

Withdrawal of deteriorated irrigable land from agriculture and other organisational and economic factors resulted in a drastic shrinkage of fodder reserves for livestock in Russia and Kazakhstan; particularly, the number of sheep, goats and cattle and milk production generally dropped in these countries.

The CIS' cereals production is concentrated mainly in Russia and Kazakhstan; it is rain–fed, i.e. strongly depends on climatic and weather conditions. The productivity of cereals in these countries has a cyclic nature, and maintaining production on irrigated land is necessary for creating grain reserves for dry or bad harvest years.

The low productivity of most crops on irrigated and dried–out land in the CIS can be explained by extreme depreciation and excess service life of land reclamation and irrigation infrastructure. For example, in Russia and other CIS countries, water mains, distributary minors, intake and control structures, pump stations and spillway and drainage canals are in poor condition and most land reclamation facilities require urgent reconstruction or modernisation. To date, the service life of most existing land reclamation facilities is 30 to 50 years, which is the limit for facilities of this type. According to preliminary estimates, over 50% of hydraulic

engineering structures (HES) need reconstruction, repairs or modernisation. Most land reclamation systems, reservoirs, water control structures, dams, pump stations, intake facilities, canals, pipelines and other structures are partially unserviceable due to excessive wear. The average depreciation is 56% for large HES and 34% for medium HES. The technical condition of these structures is estimated as unsatisfactory or unsafe (Schedrin, Senchukov, 2012).

The poor reliability and performance of the irrigation and land reclamation systems in Russia are attributable to a number of issues common to all CIS countries. These include:

- organisational and legal issues: faulty water management in agriculture, absence of a unified information and analytical system for water use and irrigation and land reclamation systems and weaknesses and inconsistencies in the legal framework, standards and methodology of agricultural water use;
- environmental issues: contamination, depletion and deterioration of river basins and ground water, faulty qualitative and quantitative environmental standards of water use;
- economic issues: inefficient economic mechanisms of operation and regulation of water economy and water use, and absence of stimuli for water conservation and protection in the agriculture sector. There is the issue of attracting investments in irrigation and land reclamation infrastructure. Inadequate funding leads to inefficient operation of water economy systems, water shortages, deterioration of quality of water, and the risks of accidents and natural disasters in river basins. The weak investment capability of water economy organisations, difficulties with finding internal and external sources of finance and inefficiency of public–private partnership mechanisms all hinder reconstruction and modernisation of HES and rehabilitation and development of the water infrastructure in the agriculture sector;
- technical issues: depreciation and obsolescence of fixed assets, poor technical level of hydraulic and irrigation systems, unproductive expenses, huge water losses, poor water saving technology and absence of a system for controlling the quality and quantity of water supplied for irrigation. The engineering and technical level of existing hydraulic and irrigation systems does not meet the modern reliability and safety requirements. Depreciation and obsolescence of fixed assets and poor technical condition of hydraulic structures and coastal zones of reservoirs entail higher operating costs and the risks of accidents and natural disasters (dam failure, stream–bank erosion, destruction of dams, flood, under–flooding, waterlogging and salinisation of land, soil erosion);
- social problems: increase in morbidity rates in rural areas caused by poor quality of drinking water, poor operation reliability of water supply systems, poor protection from floods, under–flooding, waterlogging, water erosion and droughts. The most serious social implications ensue from floods affecting agricultural land, villages and economic infrastructure. The main reasons of deterioration of the situation in flood–prone areas are poor management systems, shrinkage of the accumulating capacity of watersheds resulting from human activities, intensive practical use and development of flood–prone areas without protection measures, faulty flood and drought forecasting, and the absence of a reliable emergency warning system.

Therefore, the main systematic problems of the irrigation and land reclamation systems in CIS countries are:

- poor drinking water and household water supply;
- shrinkage of reclaimed areas, especially irrigated land;
- poor condition of irrigated farming and irrigation and drainage systems and wasteful water use practices;

- negative effects on water bodies and poor quality of water;
- deterioration of the technical condition of fixed assets, such as hydraulic structures;
- increasing damage from natural and man-made emergencies;
- weak legal framework, methodology, economic mechanisms and technical and information support and inefficient management of irrigation and hydraulic systems in the agriculture sector; and
- lack of qualified research and production personnel in the irrigation and hydraulic systems in the agriculture sector.

Addressing the above problems is one of the key goals for international cooperation. It will be necessary to formulate and adopt a new strategy for irrigation and water economy development in the CIS countries. Priority should be given to cooperation in conducting research, developing methodology and regulations, implementing joint projects and environmental protection measures in river basins aimed at securing water supply to agriculture and enhancing food security of the CIS.

A common trend in CIS countries' agrarian policy is that they all strive to secure food self-sufficiency and therefore ignore existing opportunities for regional specialisation and trade in food. To this end, it would be advisable to consider trends in global food security, a sphere in which water resources play an important role.

According to a study conducted by the International Commission on Irrigation and Drainage (ICID), 44% of all world water and irrigation organisations were public, 23% were non-governmental, 6.7% were private and 13.5% were joint-stock companies or public-private partnerships. Thus, large hydraulic facilities and water mains owned by state companies were funded principally from the national budget of the respective country, whereas smaller, privately owned or mixed-ownership facilities were partially funded from the national and municipal budgets.

Table 1.9 shows participation of the state and water users' organisations in the financing of lump-sum and operating costs of water infrastructure.

Table 1.9.
Participation of the state and water users' organisations in the financing of water infrastructure

Source: Vasilyev et al., 2012: 27

Country	Capital investments in development (%)		Operating costs (%)	
	State	water users and municipalities	state	water users and municipalities
Spain	70	30	50	50
France	50	50	0	100
Canada	75	25	50–70	30–50
Japan	100	0	0	100
USA	70	30	50	50

As seen in *Table 1.9*, the state provides from 50 to 100% of lump-sum costs in capital investments, whereas water users contribute 25–50%. The state also contributes 50–70% of operating costs or, as is the case with France and Japan, all operating costs are paid by water users and municipalities (Vasilyev et al., 2012: 27).

Irrigation brings about both direct benefits related to production and income and indirect benefits related to mitigation of the negative impact of floods in downstream areas.

However, there are some negative implications of irrigation, which are typical of transboundary river basins. They change water use conditions for downstream countries and cause serious economic and environmental damage. The implications may include reduction of

flow augmentation, limited access to water in downstream countries and shrinkage of river delta areas which play an important role in maintaining biodiversity and flood control. The aggregate negative impact on the main water and land systems reached such a scale that in some cases they threaten means of existence and agricultural activities associated with water resources.

On the whole, the increasing water shortages impede crop production on irrigated land, especially in most seriously affected regions. In countries with low or medium income levels and rapidly growing population demand for water outstrips supply. Increase of demand for water from agriculture and other sectors leads to competition for water resources, which in turn results in environmental damage and social and economic tension. In regions with unstable precipitation levels in which any further development of water systems is hardly possible, farm production will be limited primarily by water shortages rather than unavailability of land.

Hydropower occupies a prominent position in the water economy structure of CIS countries; construction of canals, diversion of run-off between river basins, etc. are ultimately related to this sector to some extent. At the current stage, the development of hydropower creates the basic preconditions for economic growth and on the other hand, necessitates integrated water management, especially in Central Asia. The CIS has considerable hydropower potential, producing about 10% of the world's electricity. The key players in the CIS' hydropower sector are Russia, Tajikistan and Kyrgyzstan. Russia is in the top ten countries in terms of total capacity of hydropower plants. Russia's hydropower complex comprises over 80 HPP (not including small ones) with a total installed capacity of about 46,000 MW and a long-term average annual output of 180 billion kWh/year, which is 22% of the total installed capacity and 18.6% of the total output of all Russia's power plants, respectively.

Country	Hydropower resources potential (in billions of kWh/year)							
	gross[1]		technical[2]		economic[3]		utilised[4]	
	total	share in the CIS (%)	total	share in the CIS (%)	total	share in the CIS (%)	Total	share in the CIS (%)
Azerbaijan	40	0.98	16	0.73	12	0.9	2.54	1.1
Armenia	7.5	0.18	3.5	0.16	3.5	0.27	1.7	0.7
Belarus	0.85	0.02	0.52	0.02	0.25	0.02	0.028	0.01
Kazakhstan	170	4.18	30	1.37	23.5	1.83	9	3.9
Kyrgyzstan	249	6.1	99	4.5	55	4.27	14	6.1
Moldova	0.012	0.0003	0.01	0.0005	0.009	0.0007	0.003	0.001
Russia	2,900	71.32	1670	76.3	852	66.26	160	69.85
Tajikistan	527	12.96	317	14.49	317	24.65	19.5	8.5
Turkmenistan	24	0.59	5.8	0.26	2	0.15	0.1	0.04
Uzbekistan	107	2.63	21.1	0.96	15	1.17	8.2	3.6
Ukraine	44.7	1.1	21.5	0.98	17.5	1.36	14	6.1
Total	4,066.06	100	2,188.43	100	1,285.76	100	229.07	100

Note: [1] gross hydropower potential means the energy equivalent of hydropower reserves given full utilisation of all respective hydropower resources; [2] technical hydropower potential means a portion of gross potential which can be utilised by modern technical means, subject to social and environmental requirements; [3] economic hydropower potential means a portion of technical potential which can be used economically, subject to social and environmental requirements; [4] utilised hydropower potential means a portion of hydropower resources which is being utilised.

Table 1.10.
Hydropower resources of CIS countries

Country	Total installed capacity (MW)	Power generation (In billions of kWh)	Including HPP (capacity and power generation, share in the country)				Large dams	
			capacity		power generation			
			MW	%	billion kWh	%	dams	%
Azerbaijan	6,297	20	1,045	16.6	2.7	13.5	35	12
Armenia	4,014	7.4	1,138	28.4	2.5	33.8	53	18
Belarus	7,987.1	32	16.27	0.2	0.03	0.09	–	–
Kazakhstan	19,798	86.2	2,267	11.5	7.9	9.2	5	1.7
Kyrgyzstan	3,746	14.96	3,030	80.9	14.13	94.5	18	2.5
Moldova	2,988	5.5	64	2.1	0.36	6.5	–	–
Russia	223,600	1040.5	47,500	21.3	164.15	15.8	102	35.2
Tajikistan	5,190	16.1	4,772	93.7	16	99.4	17	5.8
Turkmenistan	3,984.2	18.27	1.2	0.03	–	–	–	–
Uzbekistan	12,514	52.75	1,414.7	11.3	4.6	8.7	45	15.5
Ukraine	53,311	194.1	5,420	10.17	10.8	5.6	27	9.3
CIS, total	343,429.3	1,487.8	66,666.17	19.4	223.2	15	291	100

Table 1.11. Installed capacity and power generation at HPP in the CIS (as of 01.01.2012)

Sources: CIS, 2012; The International Journal on Hydropower and Dams.2012

Note: number of dams according to the classification of the International Commission on Large Dams; small HPP are not included

The scale of integration of CIS countries, mutual trade and economic cooperation in the region is still small and a lack of coordination in the water and energy sectors and a sharp increase in prices of fuel and food imports become the main factors urging Central Asian countries to make greater use of their water resources for power generation and irrigation. New dams with HPP, regulating structures, water mains and irrigation systems are often constructed in violation of basin principles, environmental requirements pertaining to maximum permissible withdrawal of transboundary river runoff, with no regard to the quantity of available water resources and their utilisation in the short and longer term and without notifying neighbouring countries of the intention to build structures on a transboundary river. Therefore, joint commissions on transboundary rivers should take on a greater role in ensuring that the stakeholders make concerted efforts and prevent deterioration of water use conditions or environmental situation in a river basin. One of the first basin commissions in the CIS was the International Coordinating Water Economy Commission of Central Asia (ICWEC) founded by an agreement between Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan and Turkmenistan on cooperation in joint management and protection of international water sources (1992). The ICWEC and its bodies are incorporated into the structure of the International Aral Rehabilitation Fund. Members of the ICWEC are heads of water economy organisations from Central Asian countries. The ICWEC meets on a quarterly basis and extraordinary meetings may be convened on the initiative of any party. Meetings are held in each of the member countries in turn and are presided by a host country.

The organisational structure of the ICWEC includes the following executive bodies.

The Amudarya and Syrdarya water economy associations, headquartered in Urgench and Tashkent, respectively, regulate the use of water resources on the basis of limits set by the ICWEC and manage the operation of hydraulic structures, international canals and other facilities on transboundary rivers.

The ICWEC research and information centre is an analytical and information body which cooperates closely with the network of research and project organisations of five states. The centre has its seat in Tashkent and branches in three Central Asian countries.

The coordination and methodology centre was founded for the purposes of unifying methodology and providing support for introducing computer–aided management at international facilities and structures of transboundary rivers in the Aral basin.

The ICWEC Secretariat coordinates the activities of the ICWEC from its office in Khodzhent, Tajikistan.

The scope of activities of the ICWEC also covers the upgrading of qualification of top and medium–tier specialists from Central Asian countries. To this end, an ICWEC training centre was set up in Tashkent.

The Commission of the Republic of Kazakhstan and the Kyrgyz Republic on International Use of Water Economy Structures on the Chu and the Talas Rivers (the Chu and the Talas Commission) was founded in 2006 by an agreement between the Government of Kazakhstan and the Government of Kyrgyzstan on the use of water economy structures on the Chu and the Talas rivers (2000) with the support of international financial institutions, UN structures and donor countries (ADB, ECE, ESCATO, UN and others).

The Chu and the Talas Commission consists of the Kazakh and Kyrgyz parties; each party consists of a chairman and members. Members are appointed by the Governments and meet at least twice a year. The Commission's permanent executive body is the secretariat consisting of the secretariat of the Kazakh party and the Secretariat of the Kyrgyz party. The Secretariat meets alternately in Kazakhstan and Kyrgyzstan. The main tasks of the Secretariat are to prepare Commission meetings, address organisational issues, prepare annual reports and some other coordinating functions. The Commission has working groups on:

(a) legal and institutional issues;

(b) distribution of water resources;

(c) hydraulic engineering work and reconstruction of facilities;

(d) economy, environment, monitoring and data exchange.

The activities of these working groups are coordinated by the Secretariat.

Similar commissions and bodies on joint transboundary river management have been founded in many international river basins across the CIS[2]. The solution of transboundary water use problems requires multilateral and bilateral commissions to exercise broader powers in integrated water resources management.

To ensure efficient management of the CIS' water resources and water, energy and environmental security, a great deal of water economy measures need to be implemented and higher levels of organisation of research and design work should be achieved. Practice suggests that new approaches are necessary for the funding of R&D work, organisational forms of design institutions and the training of personnel for these. The regulations of the design and building sectors need to be revised urgently, as many standards, rules, instructions and recommendations are obsolete and do not meet the requirements of the day. Notably, the design sector does not now receive young professionals, because there are no educational institutions in the CIS that provide training in R&D in the fields of water economy or water resources management.

The role of water resources in the modern economy of CIS countries and regional cooperation becomes increasingly pivotal. Multi–purpose use of water resources requires an integrated approach towards management and optimising water use practices, e.g., by economic methods. The existing systems of water charges and their economic rationale still do not correspond to

[2] River Basin Commissions and Other Joint Bodies for Transboundary Water Cooperation: Legal and Institutional Aspects. UNECE. Geneva. 2009. Page 55

actual costs, nor do they encourage a responsible attitude towards water or water conservation. The current practice of distribution of water charges and financing of water–related activities do not meet the economic conditions of efficient water use. Since water charges go directly to local budgets, the latter are the only sources from which the activities of basin water management organisations can be financed. Therefore, the economic mechanism of water management needs to be revised, i.e. direct economic relations must be established between basin water management organisations and water users.

2. Modern trends in water resources management and the water economy in the CIS countries

2.1. Geopolitical, natural and economic conditions of use of transboundary basin water resources in the CIS

Water is a vital component of the environment. Being a renewable yet limited and vulnerable natural resource, it ensures the economic, social and environmental security of humans and supports plant and animal life. Water needs to increase constantly and so does the impact of economic activity on river behaviour, as a considerable portion of river runoff is withdrawn for industrial and household needs and irrigation.

River runoff changes in time and demand for water does not coincide with the runoff cycle; therefore, reservoirs are built to accumulate and redistribute runoff during a year and create water reserves for dry periods.

The modern runoff of large and smaller rivers changed substantially as a result of regulation by hydraulic structures. It should be pointed out that introducing additional water resources into economic turnover requires huge energy and financial costs, which preclude obtaining maximum benefit from utilising hard–to–get water resources.

In natural conditions, river water has low salinity; its qualitative characteristics are determined by groundwater which feed rivers, partially by surface flows and to a greater extent, by contamination of the water–shed area or the river itself. The natural and climatic conditions of renewal and formation of river runoff available for the economy set stringent requirements for the prevention of depletion and contamination or water resources. Water use and recycling are seriously complicated by the problem of contamination which does not exist for other resources. As a result of increased water withdrawal and use and, accordingly, increase in the volume of contaminated water returning to river systems, the renewable potential of freshwater bodies may drop to such a critical level that some regions which now face water shortages will be cast into economic recession. Bearing in mind the uneven distribution of water both territorially and seasonally and heavy anthropogenic contamination, the solution of water problems requires first of all ensuring control over contamination of rivers.

Water resources including rain water, rivers, lakes, ground water and contaminated water represent a unitary resource, which implies interdependence of regional, national and local water use initiatives within a river basin. Water resources have a number of specific features which need to be taken into account in water use management:

- there is a permanent water cycle in nature; the quantity and quality of water available within a given area depend on climatic and meteorological factors, runoff and in the case of transboundary river basins, consumption in other countries. Water does not belong to a particular area like, for example, mineral deposits and can be used for multiple purposes repeatedly;

- the quantity of natural water resources is subject to temporal fluctuations (seasonal and perennial), which differ from one river basin to another. Since water resources are variables of a stochastic nature, they cannot be counted by simple summation like mineral deposits;
- the formation and renewal of water resources occurs and is regulated within natural drainage basins; this causes problems in developing water budgets and water use planning;
- water resources within a river basin have the properties of unity and interdependence which are determined by the natural conditions or river runoff formation;
- water resources are highly vulnerable to anthropogenic impact and climate change, which necessitates on–going assessment. Particular attention should be paid to regular changes in the qualitative characteristics of water which are pronounced stronger than for any other resources;
- when planning any economic activities in a river basin, their implications for the environmental situation in the remaining area of the basin must be taken into account;
- the multi–purpose use of water resources (household, hydropower, irrigation, industrial rural, stockwater development, water transport, timber rafting, fishery, recreation) is a complex task which requires clear definition and allocation of functions of all stakeholders and efficient coordination between them;
- regulation and distributions of river runoff must be aimed at securing the environmental stability of the entire river basin; water use must be planned accordingly, with due regard for quantitative and qualitative assessments of water resources.

The use of water resources in various industries also has some essential features:

- water consumption varies greatly depending on the season or the time of day;
- demand for water does not always match availability and this complicates distribution between users;
- water bodies are also used as collectors of sewage water, which requires multi–fold dilution of the sewage water.

This condition becomes infeasible bearing in mind the shortage of water resources, which eventually leads to deterioration of the quality of natural water and water use conditions and increase of cost of water treatment in water supply systems and industrial facilities. Deterioration of the quality of surface water resulting from discharge of poorly treated water into water bodies by various industrial and utility companies can cause material environmental and economic damage, for example, to drinking water supply, fishery, irrigation, industry and recreation.

Unbalanced water use which disregards the volume of available water resources and the needs of other water users changes the resource base in one part of a water economy system and affects water users in another. Intensive economic use of surface and surface water can have lasting effects for the entire water systems. Hydraulic structures (dams, reservoirs, etc.), built in one country often change the hydrologic behaviour of watersheds in downstream countries and the conditions of water use of supply.

The condition of water bodies and the water use conditions are exposed to a number of strong natural and anthropogenic factors; some of them are shown in *Table 2.1*.

Any one factor may have a negative impact on the entire ecosystem of a water body and water use conditions in many sectors of the economy. Examples of such factors are dry years, excessive water withdrawal and contamination of water sources with hazardous substances.

Factors	Water uses								
	Safety of water bodies and structures	River basin ecosystem	Fishery	Renewal of water resources	Drinking water	Irrigation	Industrial use	Hydropower	Water transport
Floods	X	X		X					X
Water shortage (dry years, droughts, excessive water withdrawal)		X	X	X	X	X	X	X	X
Scour, silting and reduction of conveying capacity of rivers		X			X				
Dams and intake facilities (1)		X	X	X	X	X	X	X	X
Increase in salinity		X	X		X	X	X		
Changes in the hydro-chemical condition (2)		X	X		X				
Bio-contamination (3)		X	X	X	X				
Eutrophication		X	X	X	X	X	X		
Contamination with hazardous substances (4)		X	X	X	X	X			

Note: X – influence on water bodies and water use conditions; 1 – faulty operation of regulating structures, uncoordinated construction of new facilities; 2 – accumulation of sediments on the river bottom resulting in the reduction of dissolved oxygen; 3 – organic substances and bacteriological contamination with wastewater; 4 – hazardous contamination with radionuclides, heavy metals and pesticides

Table 2.1.
Factors that affect the condition of water bodies and hydraulic structures in river basins and water use conditions

Source: UNECE, 1996: 6

"Difficulties in regulation of water relations are determined by the specific role of natural water as a major natural element and production resource for the industry, agriculture, energy, transport and many other sectors.

The main functions of water economy bodies are:

- planning of water economy measures taking into account economic development hypotheses and various sectors' requirements for water supply volume and reliability, quality of water, limits of contaminants discharge, the aggregate anthropogenic impact on water resources, etc.;
- operational water use management;
- preparation of recommendations on water use and allocation standards; and
- supervision of design, construction and operation of water economy facilities.

International experience suggests that even in a developed market environment it is not possible to apply merely economic mechanisms of ecologisation of production. Apart from the commonly known difficulties of economic interpretation of environmental situation, there are also problems resulting from the stochastic nature of water resources condition and impossibility of on-going manipulation of water prices, water use and contamination limits and fines for violating such limits.

Special organisational and legal measures are necessary to implement adequate water use technologies as soon as possible. The solution of this problem must be comprehensive and can be achieved by combining the following elements of management:

- economic mechanisms, such as, for example, the sale of excess water quantities or contamination right within the set limits by companies or stimulating water–saving technologies based on a closed cycle;
- efficient control over compliance with environmental protection requirements and standards and implementation of necessary environmental protection measures;
- administrative methods of influencing water users, such as provision for suspension of production, closing down facilities, termination of water body lease agreements, etc.; and
- improving population's awareness of environmental requirements and possible consequences of violation of such requirements and public spending on environmental protection.

For the methodological aspect of water resources management, we should note that this dynamic process can be divided into several inter–related phases and implementation of management measures is eventually based on the results of an integrated analysis of all developed decisions. The procedure of developing managerial decisions is iterative. Each phase of management produces some final results that serve as inputs for the next phase. The analysis of the contents of separate phases of water resources management can help clarify the issues of distribution of responsibility and interaction between various management structures in the course of developing and implementing solutions on efficient use and protection of water. At all management stages, mathematical models and computers should be used for processing information and developing management decisions. The initial stage of the water management process deals with providing of the rationale for its goals. This requires a comprehensive analysis by ecologists, economists, hydrologists, hydrobiologists, hydrochemistry professionals, hydraulic engineers, etc. An environmental and economic analysis of regional basin systems allows requirements for the perspective condition of water sources to be substantiated" (Pryazhinskaya et al, 1993: 625–630).

Large river basins were of particular importance to world civilisations, and the basin–based approach in studying hydrological regularities has been widely applied since the 18th century in geographic, historical and other related sciences (Vinokurov, Zherelina, Krasnoyarova, 2004: 4–13; Ivanovich, 2008: 101–104).

The beginning of the 20th century was characterised by the increasing global and regional environmental problems caused by transboundary contamination of the atmosphere and water, desertification and deterioration of biodiversity potential, which led to the emergence of an ecopolitical approach which envisages broader international and border cooperation. In limology (the scientific study of borders, from Latin *limes* – "border"), which forms part of many social and even technical disciplines, a special inter–disciplinary branch emerged which deals with transboundary environmental and political problems; it is essentially the domain of political scientists, international law professionals and geographers. One of its directions is the basin–based approach which allows natural, social and geographic studies to be combined, particularly, in resolving international conflicts, and new principles of environment quality management to be developed. River basins not only feature a high degree of unity of natural and anthropogenic processes, but also provide a basis for population displacement, transport, and explain the historic unity of the population of particular areas. Therefore, the problems of the use of water, energy and biological resources, environmental pollution, water transport and transit must be addressed in an integrated manner based on the basin principle (Kolosov, 2003).

In the early and mid–20th century many hydraulic structures were built all over the world for the purposes of water transport, flood control, irrigation and hydropower. This necessitated integrated use of water resources and a switch to the basin principle in river management in order to ensure that the interests of all water users are taken into account.

The principles of integrated water resources management were formulated for the first time in the Dublin Declaration (1992). Integrated water resources management is viewed as a process which facilitates coordinated management and development of water, land and other related resources in order to maximise economic and social welfare. It is implemented in a fair manner, without risks to ecosystems, and with due regard for the fact that any intervention may affect the stability of a river ecosystem. Integrated management produces a much greater aggregate effect as compared with any separate measures implemented within a basin (TD, 2004; MK, 2008).

Integrated water resources management in river basins is exercised on the basis of administrative and territorial unit or countries and envisages a unified approach towards economic interests and water policy goals at the national and international levels within the entire river system. In so doing, the various aspects of water use must be well balanced – for example, water quality and quantity, use of groundwater, land use and economic and environmental issues (UNECE, 2009: 82).

Adequate maintenance of large and smaller river basins requires joint basin management by all participating countries in order to secure the required quality and quantity of water resources (UNDP, 2003: 380).

The definition of an international river basin appeared not long ago, as the basin principle of water resources management developed, the number of countries lying within river basins increased, and the need to settle international conflicts on the basis of international water law emerged. It should be noted that this term appeared in connection with the introduction of the term "geographical district", which may cover two or more states and is determined by the boundaries of a watershed, including surface and ground water which feed common watercourses. This term is used in international conventions on transboundary watercourses, and provides a basis for a number of bilateral and multilateral agreements in this field.

The basin principle of water resources management was adopted in most CIS countries as a fundamental principle and provides a basis for planning and efficient use and protection of water. The functions of public water resources management and quality control of water economy bodies in some CIS countries were taken over by environmental ministries.

The main tasks of the basin water resources management (BWRW) and its structural departments in Russia are:

- to address problems in the water economy, implement a single water economy policy, introduce the basin principle in water resources management;
- to participate in the development of public, international and regional programmes for the use, protection and rehabilitation of water resources;
- to study the water needs of various sectors and the population, implement measures for ensuring efficient use of water resources;
- to carry out hydrochemical, radiological and toxicological studies as part of the public system of water monitoring;
- to collect, process and analyse statutory statistical reports on the use of water resources and maintain a public water cadastre;
- to approve applications for special water uses;
- to participate in the organisation of measures for prevention and mitigation of the harmful effects of water , including protection of residential areas and land from floods;
- to develop and implement operational rules for multi–purpose reservoirs and water systems, and supervise observance of the rules;

- to exercise public management of water resources, and to address other issues of water economy;
- to supervise:
- efficient use and protection of water resources in accordance with the current law;
- observance of the state's ownership of water;
- availability and condition of water protection structures and equipment;
- observance of water economy rules in water protection and coastal zones;
- the reliability of information on the use of water resources, observance of the rules of primary registration of quantities of water withdrawn from, or discharged into water bodies;
- observance of efficient water use plans;
- observance of the rules of operation and maintenance of hydraulic structures and equipment; and
- progress of international cooperation in the use, protection and rehabilitation of water resources.

The need for further improvement of basin–based water resources management was reflected in the World Pact for Better Basin Management (Marseille, 2012), which particularly notes that:

- it is becoming imperative to introduce new forms of governance of water resources;
- river, lake and aquifer basins are the relevant territory for the organisation of joint management of water resources, aquatic ecosystems and all activities impacting water;
- various ecosystems in river basins play an important role in maintaining biodiversity and environmental services, regulation of water cycles and prevention of hazards and contamination;
- the basins of transboundary rivers, lakes and aquifers are to be paid particular attention and be jointly managed by the riparian Countries;
- the establishment and strengthening of international commissions, authorities or other transboundary basin organisations facilitate dialogue, cooperation, information exchange and implementation of joint projects and actions, for sharing profits, anticipating the future and helping prevent potential conflicts between the stakeholders concerned;
- it is necessary to harmonise policies and laws, to promote, inter alia, the establishment and strengthening of appropriate river basin organisations, including by implementing regional programmes of common interest as a prerequisite to improving surface and groundwater resources management at basin level;
- it is necessary to create or strengthen the funding dedicated to the management of water resources and aquatic environments and generally of the "great water cycle";
- it is useful to develop or strengthen federating frameworks for basin management world–wide and in large regions, to facilitate bilateral or multilateral initiatives in this strategic field;
- it is necessary to unite and involve in basin management interested parties representing civil society and local governments;
- it is necessary to increase cooperation among basin organisations around the world and in each region to facilitate the sharing of experience and know–how on best practices in river basin management and their adaptation to different contexts.

The International Network of Basin Organisations (INBO) founded in 1994 with a headquarters in Paris, France (Permanent Technical Secretariat) provides support for integrated water resources management at basin level as the main tool of sustainable development. The main tasks of the INBO are:

- to promote long–term relations between organisations interested in such integrated management and support exchange of experience and knowledge between them;
- to promote introduction of tools of organisational and financial management, development of expertise, monitoring of water resources, organisation of data banks and coordinated preparation of plans of action for medium and longer–term;
- to develop information and training programmes for local elective officers, representatives of water users and various interested parties involved in water management and executive bodies and personnel of organisations responsible for water management at basin level;
- to provide support to the population on the above issues;
- to promote the principles of basin water resources management under international cooperation programmes; and
- to evaluate the on–going activities of basin organisations and to disseminate their best practices.

Bearing in mind the need to preserve the quality of natural water sources, a river basin is viewed as an ecosystem which sustainable condition must be subject to respective legal, institutional, organisational and economic measures, i.e. must be managed. A river basin is viewed as natural object not only for the purposes of pursuing economic interests but also for preserving the natural habitat of various biological species. It is obvious that the functional unit is not merely a river but all area from which the river collects water; as a result, economic activities within a watershed must be planned in an integrated manner.

A river basin is a natural unit of water economy management. Any decisions on allocation of water resources must be made within a river basin. At this level, in accordance with the hierarchical structure of a management system, the balance of interests of water users must be ensured and their actions must be coordinated. Integrated water use management consistent with public interests can be efficient only if based on the basin principle. It must be implemented through basin–level management bodies having adequate powers.

A special function of the water economy is protection of population, economic facilities and natural systems from the harmful impact of water; this activity is closely related to security and a wide range of other social issues. Another specific function of the water economy is securing access to quality drinking water for the population. These special functions suggest that the water economy must be subject to regulation, but also materially complicate the application of the technical and other means used in other sectors and reduce their efficiency, necessitating the development of special approaches towards management and methods of forecasting, planning and regulation.

"Integrated river basin management" and "integrated water resources management" (IWRM) are two different facets of the same concept. Many decisions on water resources management and related issues of farm production, hydropower, water transport, fishery, etc. may be made only at the level of international cooperation between states or national public management bodies. Therefore, IWRM is first of all a mechanism of political cooperation which enables water economy players which have an international or national status to achieve their goals and reach an agreement on the balance of their economic, social and environmental water needs.

Further division of management tasks and functions in the water economy requires thorough scientific rationale which must provide a basis for improving legal, organisational and economic

mechanisms of water use and protection, particularly, in the transboundary context (Danilov–Danilyan, Pryazhinskaya et al, 2006: 16–21).

Transboundary influence on river systems requires coordination of joint water protection measures on national, regional and international levels. In modern conditions, any transboundary river is a complex of interrelated water bodies and structures covering the territory of several states. To ensure smooth operation of the water system, the activities of national water economy bodies must be coordinated on a unified legal, engineering and environmental basis.

Mutual interest of different states in using international rivers is one of the objective reasons why coastal states should broaden their cooperation. In international law, cooperation in a transboundary river basin is based on a number of generally recognised principles. First of all, a coastal state may use water from an international river to the extent that such use does not affect the sovereignty and territorial integrity of another state. Mutual respect for state sovereignty is a general imperative principle of modern international law. Therefore, water use by a coastal state must not prejudice water use by other states. All issues pertaining to any material change in the condition of an international river must be agreed by all interested states. Water resources of transboundary rivers must be allocated on the basis of equality and respect for the sovereign rights of each stakeholder. In accordance with these principles, each coastal state is entitled to a reasonable and fair portion of water from a river basin. This issue must be considered by interested parties of each particular river basin with due regard for climatic, hydrological, demographic and economic conditions and any increase in demand for water from economic sectors.

As a rule, states strive to cooperate in water resources management, therefore it is necessary to develop forms of such cooperation which would serve common interests. These forms must facilitate economic integration and solution of social and environmental problems in transboundary river basins. Finding common points in the legal and economic aspects of cooperation requires on–going political dialogue which should be based on international law pertaining to this field and the past experience of bilateral and multilateral cooperation, thus reducing the investment risks of financial institutions participating in water economy or hydropower projects.

2.2. Institutional and legal aspects of regulation and protection of water resources in CIS countries

The water law of most CIS countries contains a number of terms and provisions relating to water resources management. For example, in the Water Code of Azerbaijan “water resources” means “the volume of surface and ground water in water bodies which are or can be used”, “water object” means a natural landscape or geological structure within which surface or ground water is contained, having the size and specific features suggesting the existence of a water regime. All inland water bodies including the country’s sector of the Caspian comprise the national water fund.

In the Water Code of Armenia, “water resources” means all surface and ground water including streams, rivers, springs, wetlands, lakes, ponds, snowfields, glaciers, aquifers and other bodies including temporary ones. The term “national water reserves” means water in such a quantity and of such quality as may be required for the satisfaction of the basic human needs in the present or future, preservation of natural water ecosystems and ensuring sustainable development and use of water resources. “Usable water resources” means a portion of water resources which can be distributed for consumption without reducing the national water reserves.

The Water Code of Belarus does not provide a definition of water resources or water objects, but indicates that “all water (water objects) located within the country’s territory form up its national water fund”.

The Water Code of Kazakhstan defines "water objects" as waters concentrated in the surface relief or below the surface which have boundaries, a volume and a water regime. These include seas, rivers, canals, lakes, glaciers and other surface water objects, and aquifers. The country's water fund includes all water objects within its territory which are included or subject to inclusion in the state water cadastre. Notably, Kazakhstan's Water Code does not class artificial water bodies (reservoirs, ponds, etc.) as water objects, but contains a provision on inclusion of water objects in the water fund based on their inclusion in the state cadastre. In our opinion, this unclear definition of water objects can result in misrepresentation of the country's water fund size. The Water Code also provides a definition of "water resources", which means "the reserves of surface and ground water contained in water objects which are or can be used".

The Water Code of Kyrgyzstan defines "water resources" as all water within the state borders and "water fund" as all water objects, water resources and water economy structures, including water fund land.

The water law of Moldova provides that "water resources" are surface and ground water and atmospheric precipitation within the country's territory. It is stated that "water is a renewable, vulnerable and limited natural resource, an essential part of life and society, a key factor of maintaining an environmental balance, a raw material for production, a source of energy and a means of transport", that "water is not a commercial product like others, but natural heritage which requires due protection and treatment" (article 4), and that water resources management must be exercised on the basis of watersheds located within the country's territory (article 5).

The Water Code of Russia provides that "water resources" include "surface and ground water contained in water objects which are or can be used" and a "water object" is a "natural or artificial body of water, watercourse or other object, or any permanent or temporary concentration of water having the special forms and features of a water regime". Unlike the water laws of Kazakhstan and Tajikistan, the Russian Water Code classes artificial bodies of water as water objects. "Water fund" means "all water objects within the country's territory".

In the Water Code of Tajikistan, the term "water resources" means "reserves of surface and ground water contained in water objects which are or can be used", and "water object" means concentration of water on the surface relief or below the surface have the boundaries, volume and features of a water regime. According to these definitions, the country's water objects include rivers, lakes, glaciers, snowfields and other surface sources and areas of concentration of ground water, including medicinal and thermal sources. The country's water resources comprise all kinds of surface and ground water. Notably, these definitions and provisions, like in Kazakhstan's water law, contain no reference to artificial bodies of water, although it is implied that they are also included in the country's water fund. Thus, the state water fund of Tajikistan comprises all water objects and water resources contained in them, and land occupied by them including water protection zones. Tajikistan remains the only country of the CIS to have introduced the concept of "integrated water resources management" in its law. This means a "system of management based on the registration and interaction of water (including surface, ground and recycled water), land and other related natural resources within defined hydrographic boundaries which combines the interests of different sectors and hierarchical levels of water and natural resources use and involves them in the process of decision–making, planning, financing, protection and development of water resources in the best interests of sustainable development of society and environmental protection".

Turkmenistan's Water Code provides that "all water objects and land occupied by them, including water protection zones, comprise the state water fund of Turkmenistan". It "includes rivers, reservoirs, lakes, inter–farm canals, drainage channels and other surface bodies of water and watercourses, ground water, and the Caspian within the state border of Turkmenistan".

Uzbekistan's Law On Water and Water Use states that water is "public property and national wealth of the Republic of Uzbekistan, is subject to efficient use and is protected by the state". The unified state water fund of Uzbekistan includes streams, rivers, reservoirs, lakes, seas, canals, drainage networks, springs, ponds and other surface water, ground water, snowfields and glaciers.

The Water Code of Ukraine provides that all waters (water objects) within the country's territory are the national wealth of the people of Ukraine and a natural foundation of its economic development and social welfare. Water resources support the existence of humans, animals and plants and are limited and vulnerable natural objects. Under Ukrainian law, a "water object" is a natural or artificial element of the environment which contains water (sea, river, lake, reservoir, pond, canal, aquifer); and "water resources" are the volume of surface, ground or sea water within the country's territory. Ukraine's water law, like in Russia, provides that a water object includes any artificial elements of the environment. The introduction of this definition in the law precludes any incorrect inclusion of artificial bodies of water (reservoirs, ponds, etc.) in the country's water fund. All waters within the Ukrainian territory are its water fund and exclusive property of the people of Ukraine which can only be made available for use.

The socioeconomic changes in CIS countries, transition to a mixed economy and introduction of the institution of private property necessitated the division of public and economic functions relating to the supply of water to the population and various economic sectors. Thus, the solution of the tasks of "water resources management" and "water economy" gave rise to a new approach towards efficient use and protection of water resources, which is now reflected in the current water laws of CIS countries.

In accordance with the constitutions and water laws of CIS countries, the water fund, water reserves, water objects and water resources are property of the state. For the purposes of water management, the state exercises its exclusive functions of maintaining a unified state water cadastre and water monitoring. The state develops water balances and programmes of comprehensive use and protection of water resources, encourages investments in programmes aimed at improving water supply, protection of water resources and combating floods, droughts and other disasters related to water. Thus, the provisions of the constitutions and water laws of CIS countries define the role of the state in implementing the above measures and provide a legal framework for water resources management.

The "water economy" was understood as "a sector of the economy dealing with studying, registration, use and regulation of water resources, protection of water from contamination and depletion and transportation of water to the place where it is to be used. These tasks are carried out by building various engineering structures (household and industrial water systems, reservoirs for regulating river runoff and dams for flood control), artificial waterways, improving conditions for river navigation and fishery, etc. These tasks characterise the wide range of functions of the water economy related to the satisfaction of demand for quality water from production sectors and the population. Primarily, the water economy is concerned with the organisation of drinking and household water supply" (Arsenyev, Ivanenko, 1993: 9). These tasks are interrelated and, although they are dealt with by different economic sectors at the administrative, territorial, basin and local levels, it can be said that all objects of the water economy together comprise a single water complex.

With the introduction of the institution of "water resources management" in the CIS countries, most of the above tasks are considered functions relating to public management of the water fund (water reserves) of a country.

Therefore, it can be said that the water economy of CIS countries includes activities relating to the organisation of industrial, household and agricultural water supply and design, construction and reconstruction of hydraulic and water economy structures. Most of these tasks and functions

are delegated to market players on a competitive basis and the players themselves are typically privately owned, since they were privatised and reorganised into joint–stock companies. The water economy or, more precisely, organisations and companies comprising it, in the new economic and political environment represent different forms of ownership: public, private or mixed.

It should be stressed that distribution of functions between water resources management and water economy in each particular country is a fairly difficult scientific and methodological task (Danilov–Danilyan, Pryazhinskaya et al, 2006). In each case distribution of water resources management and water economy tasks is unique and cannot follow any "standard" pattern. Simple copying of successful practices may not bring about the desired outcomes, since the experience of water resources management or water economy institutions from one country may be incompatible with the economic, technical, legal, social or cultural environment of another country.

As we mentioned above, one of the key tasks of water resources management is to ensure renewal of water resources, which generally means preventing the depletion and contamination of natural water sources and controlling the impact of economic activities on the natural processes of formation and renewal of surface and ground water. The main precondition of renewal of water resources is to preserve and rehabilitate the self–purification ability of river (water economy) systems by preventing excessive water withdrawal and contamination, i.e., water resources management must promote water use practices which do not interfere with the natural water regime of a river or affect the quality of water in it.

The essential role of water in nature must be taken into account in making decisions on any issues of economic water use and long–term economic and social development of a country or a region. Therefore, water resources management must be based, first of all, on evaluation of their condition and planning of measures for maintaining the stability of river basin ecosystems. The separation of water resources management functions from water economy functions is one of the ways to solve the problem of estimating the value of water resources contained in a given water object and creating efficient water use and protection mechanisms on this basis.

2.3. Improving the organisational and legal mechanisms of water resources management in CIS countries

Water reforms in CIS countries reflected the different economic and political development models adopted by these countries. As a result of these reforms, a new branch of water economy emerged: water resources (water fund) management which, since the water fund is public property, is the exclusive function of the state. Notably, the modern system of state water resources management existing in some CIS countries virtually represents the return to the period when the first public water use and protection bodies were created. In some countries water resources management functions were delegated to the environmental protection sector (in Armenia, Belarus, Kazakhstan, Moldova, Russia, Ukraine). Water resources management are delegated to the Ministry of Emergencies in Azerbaijan; to the Ministry of Agriculture and Land Reclamation in Kyrgyzstan; to the Ministry of Energy and Water Resources in Tadjikistan; to the Ministry of Water Economy in Turkmenistan; and to the Ministry of Agriculture and Water Economy in Uzbekistan.

Water resources management is a dynamic process of planning, organising and supervising the use and protection of water resources, and forms part of a general public governance process. In many higher education institutions in the CIS environmental curricula include "water resources management" which deals with the issues of organisation of water resources management, comprehensive use and protection of water resources, water economy calculations, assessment of water economy activities, planning of hydrometeorological surveys and statistical processing of obtained data, etc.

Integrated water use and protection is one of the fundamental principles of basin water resources management. The water laws of most CIS countries provide for the development of programmes of comprehensive use and protection of water and basin management plans which provide a basis for water economy measures implemented in river basins. In some countries (Armenia, Kazakhstan, Kyrgyzstan and Tajikistan), coordinating bodies were created within governments, which reflects the intention to integrate water policy into national socioeconomic development strategies. Tajikistan's water law mentions integrated water resources management, but does not provide a legal mechanism for it.

Country	Basin management principles		Comprehensive water use and protection schemes		Basin councils and agreements		Coordinating body within the government		IWRM	
Azerbaijan	x	Articles 16, 93	x	Article 22 (SIWUP)	x	Article 93 (BA)	–	–		
Armenia	x	Article 17	–	Article 17 (BMP)	–	–	x	Articles 8, 9, 10, 13, 14, 63, 64		
Belarus	x	Article 31	x	Article 93 (SIWUP)	–	–	–	–		
Kazakhstan	x	Articles 34, 40, 42, 43	x	Article 46 (SIWUP)	x	Articles 42, 43 (BC, BA)	–	Article 131		
Kyrgyzstan	x	Articles 5, 11	x	Article 20 (BP)	x	Article 10 (BC)	–	Article 9		
Moldova	x	Article 5	x	Article 19 (BDMP)	–	–	–	–		
Russia	x	Article 3	x	Article 33 (SIWUP)	x	Article 29 (BC)	–	–		
Tajikistan	x	Articles 9, 140	x	Articles 8, 139 (SIWUP)	x	Article 140 (BC)	x	Article 122, 140	x	140
Turkmenistan	–	–	x	Articles 6, 102 (SIWUP)	–	–	–	–		
Uzbekistan	x	Article 8	x	Article 111 (SIWUP)	–	–	–	–		
Ukraine	X	Article 13	x	Article 12 (SIWUP)	x	(BC, BA)	–	–		

Table 2.2. Provisions on integrated water resources management and protection in the water law of CIS countries

Source: developed by the authors on the basis of CIS countries' water laws

Notes: x; Article – an integrated water use and protection component and the respective article in the law exist; SIWUP – scheme of integrated water use and protection; BMP – basin management plan; BP – basin plan; BDMP – basin district management plan; BC – basin council; BA – basin agreement; IWRM – integrated water resources management

When formulating the strategic goals of water resources management, the country's water economy development in particular aspects (household and industrial water supply, irrigation, hydropower) and priority directions of environmental policy, it is critical to assess their feasibility. Unfeasible goals entail direct political and economic risks, increased costs for market players associated with missed profit and social losses associated with unsatisfactory water supply and low economic viability of water supply organisations and companies. The choice of any particular model of water resources management and water economy must be dictated by the political, economic, organisational, legal, technical and other factors prevailing in the country.

Conclusion

Water is recognised as a limited and vulnerable natural resource and the wealth of the present and future generations. The awareness of its social and economic value in the context of the human right to adequate quantities of quality water underlies the contemporary water policy. Water is essential to all social, economic and environmental activities and is the only means of solving all current global problems: food and energy security, public health, social and economic welfare, and environmental protection (WWAP, 2012).

Global economic development is accompanied by accelerated consumption of water resources and increased risks for sustainable water use and water ecosystems. In the last fifty years the world's water intake tripled, and at present 80% of the world's population live in areas exposed to high water security risks. It is expected that population growth will be accompanied by rapid urbanisation, especially in developing countries. By 2050 about 70% of the world's population will live in cities, which will aggravate problems with access to quality water, contamination of water sources and depletion of the natural potential (natural capital). Depletion of ground water reserves may pose a major threat to water supply in urban areas and agriculture.

The growing urbanisation spurs demand for natural resources and exerts strong pressure on water resources which form the basis of all ecosystems. Another threat to urban areas is climate change, which affects the water regime of water sources and, accordingly, availability of water. The implications of climate change affect the assets of urban communities which include natural resources (natural capital), social relations (sociopolitical capital), skills and health (health), infrastructure (physical capital) and finance (financial capital) (UN, 2011).

The rapid growth of urban communities stiffens competition for water and increases contamination of water sources with urban wastewater, thus reducing the resource potential of water ecosystems. According to current estimates, the majority of contamination sources are concentrated in cities, and over 80% of all wastewater is not treated properly. Economic losses attributable to low quality of water in some regions of the world vary from 0.5% to 2.5% of GDP.

About 40% of global farm production is based on irrigable land, so the future food security will depend on the availability of water for irrigation. It is expected that by 2050 water consumption by the world's agriculture (irrigated and rain–fed) will increase by 19%. An increase in water use for irrigated farming will occur principally in those regions which are already exposed to the negative effects of climate change, particularly, water shortages. Accelerated melting of glaciers which feed most of the world's rivers creates risks to food security associated with depletion of fresh water reserves. An increase in surface air temperature of 1 °C will cause losses in farm production of 10% (Korzun, 2012: 61).

The study of the time–space distribution of water resources is critical to efficient water resources management. This distribution is extremely uneven, as can be seen in any climatic zone and in any season. Knowledge of the special characteristics and functions of water is necessary for efficient management and use. Efficient water management institutions can do much to ensure sustainable water use by addressing environmental, economic, technical and social issues. Accessibility of water depends on various political, natural, geographic, social, economic, demographic, climatic and other conditions. As importantly, accessibility of water depends is determined by quality of water. Since water is an essential resource for all economic activities, access to water largely depends on efficient coordination between public bodies, creating

political preconditions for integrated water resources management, and efficient water use in various sectors of the economy (WWF, 2012).

The global trend towards greater water consumption and limited availability of water can be observed all over the CIS. The socioeconomic development of CIS countries is closely associated with efficient water resources and water economy management in all sectors of the economy. These countries have a strong water economy potential at their disposal which, given an adequate legal, financial, R&D and HR support, is sufficient for sustainable water use and resolving the problems of joint use of transboundary rivers.

Water shortages in some regions of the CIS are attributable principally to the poor organisation of water use in the industry and agriculture, the unsatisfactory technical condition of water infrastructure, and the inadequate financing of infrastructure maintenance and development. The switch to water–saving practices is not yet preconditioned by organisational and technical measures. In addition, CIS countries have no special laws on water saving, which would set out the necessary policies and mechanisms. The water conservation provisions incorporated in the current laws are rather declarative and are not supported by any real implementation mechanisms. There are no legal provisions for involving water users in the control of water saving and quality of water.

The obsolete system of environmental standards and the absence of mechanisms for achieving the statutory standards resulted in the deterioration of the quality of natural water sources. There is still no systemic approach towards standardisation in the water sector which would promote environmental safety and stability of river basins. Water quality monitoring is limited, since not all contaminants are covered by the exiting methodology. In rural areas, there is a sustained trend towards decentralised water supply based on ground water sources, but no quality control of such sources is in place.

Transboundary watercourses render river basin countries dependent on each other. In modern conditions, each transboundary river basin is a regulated water economy system which provides a basis for cooperation in various economic sectors. On the other hand, disagreements between countries arising in connection with joint water use on such rivers may have a strong negative effect on the region's potential for economic integration including trade, transport and labour markets.

Joint management of such systems includes not only the issues of international regulation of water distribution, but also has an economic aspect, i.e. it is important to ensure benefits for each stakeholder from cooperation in the water sector. Such an approach is the key to completing the strategic tasks of efficient use and fair distribution of water resources and maintaining the stability of water systems. The protection of water quality and reducing consumption are viewed as the most urgent problems in the CIS' water management.

It should be noted that such cooperation envisages not only solving the issues of water distribution and preserving water quality, but also enhancing the safety of hydraulic structures built on transboundary rivers.

The strengthening or creation of a basin chain and improving its organisational structure is an important aspect of improving the management of international watercourses. Basin organisations must take over the function of coordination between various sectors and ministries at regional and basin levels. These organisations must have sufficient powers for addressing the issues of efficient use and protection of water.

Water economy and hydropower projects are the most capital–intensive. To reduce the risks of investing in large hydropower plants on transboundary rivers, access to accurate and up–to–date information is necessary. It should be noted that information on the use of water resources, especially in transboundary basins, is not as readily available as data on the status of the resources themselves. The absence of information on actual water consumption in the industry,

agriculture or other sectors precludes the development of efficient measures for adaptation to climate change in transboundary river basins – the planning and preparation of measures to combat floods, droughts and other natural disasters resulting from climate change.

Sustainable water resources management and water supply requires better technical capability for data collection, processing and dissemination. Therefore, creating a single international system of hydrometeorological data and transboundary watercourse monitoring is an important precondition of efficient management at a basin level. River basin management must be aimed at well–balanced utilisation of surface and ground water and therefore the importance of planning of water use and protection measures at the local, national and international levels increases dramatically.

The limited and vulnerable nature of water has necessitated a new approach towards water resources assessment, development and management. This approach is based on integration of water economy plans and programmes within the frameworks of regional and national economic, social; and environmental policies. Given the increasing water deficiency and deterioration of water quality in transboundary river basins, any legal measures developed for regulating water relations must take into account the interests of all stakeholder and promote the safety of river ecosystems. The diverse and universal nature of water use calls for an integrated approach towards water resources management. Integrated management of water resources must promote active cooperation between sectors and disciplines. Traditional water resources management must be integrated with related activities such as land resources management, health, agriculture, industry, power, and environmental protection. Sustainable and safe water use in transboundary river basins must be based on consolidated management principles which promote integrated use and protection of water, fair and equal access to water and preservation of river ecosystems. To this end, political, legal and financial conditions must be in place at the international, national and local levels.

Securing sustainable water use and prevention of critical reduction of the potential of river ecosystems require concerted efforts at the national and regional levels aimed at addressing the following interrelated issues:

- satisfying the population's drinking water needs and enhancing sanitary safety including phased development of water supply and sewage networks in residential areas;
- ensuring food security through efficient use of water resources;
- preserving the integrity of river ecosystems;
- promoting cooperation between interested countries in the joint management and use of water resources in transboundary river basins;
- managing the risks of floods and droughts, mitigating economic losses resulting from them and enhancing the safety of hydraulic structures by improving operation and maintenance practices;
- perfecting the economic mechanisms of water use depending on the different social, environmental and cultural value of water and ensuring efficient operation of water systems and access to water;
- ensuring public control and observance of the interests of all social groups in water resources management;
- promoting environmentally safe industrial development and reducing industrial water consumption in order to prevent the contamination of water sources and infringement on the rights of other water users;
- ensuring optimum use of the hydropower potential, observance of the interests of other water users and satisfying the growing demand for electric power;

- improving the population's awareness of water and ongoing water use and protection measures; and
- diversifying water resources management in order to ensure the sustainable development of large cities and highly urbanised areas and reducing their negative impact on river ecosystems by introducing new utilities and water protection technologies.

To adapt water use in various sectors to climate change, it is critical to perfect water resources management so as to keep down environmental costs. Water use can be made more efficient and economic by combining existing technologies with new ones, promoting awareness of the status of water resources and eliminating barriers to information on water use. Advanced modern technologies must be used to collect and process this information, such as remote sensing for evaluating the status of water resources and efficiency of water use.

The CIS countries must provide adequate financial support for sustainable operation of water infrastructure. To this end, innovative financing mechanisms need to be introduced, such as private–public partnership in water economy, including external investments in water supply, sanitation, irrigation, hydropower, recreation, etc. Finally, the CIS countries must maintain technical and scientific cooperation and jointly train research and engineering personnel capable of dealing with the region's water economy and environmental challenges.

Sources

Falkenmark M., Widsrand C. (1992) Population and Water Resources: A Delicate Balance. *Population Bulletin*. 47(3). November.

FAO (1997) Irrigation in the Countries of the Former Soviet Union in Figures. Water Reports 15. *Food and Agriculture Organisation of the United Nations*. Rome.

UNICEF, WHO (2012) Progress on Drinking Water and Sanitation. *United Nations Children's Fund and World Health Organisation*.

UNESCO–WWAP (2012) The Dynamics of Global Water Futures: Driving Forces 2011–2050. Report on the findings of Phase One of the UNESCO–WWAP Water Scenarios Project to 2050. *The United Nations Educational, Scientific and Cultural Organisation. UN World Water Assessment Programme*. France. Paris.

UNICEF, WHO (2012) Progress on Drinking Water and Sanitation. *United Nations Children's Fund and World Health Organisation*.

WWAP (2012) The United Nations World Water Development Report 4: Managing Water under Uncertainty and Risk. *World Water Assessment Programme*. Paris. UNESCO.

Boikova M., Krupnikova D. (2010) Globalisaton of Freshwater Reserves: an Innovative Management Strategy. *Forsait*. No. 2. Magazine of the State University – Higher School of Economics.

Vasilyev S. et al. (2012) *The Domestic and Foreign Experience of Water Use Fees in Agriculture*. Scientific review. ROSNIIMP. Novocherkassk.

WWF (2012) *Time for Solutions.6th World Water Forum*. Marseille. 12–17 March.

Vinokurov Y., Zherelina I., Krasnoyarova B. (2004) Approaches towards the Developments of Sustainable Water Use in the Ob Basin. *Polzunovsky vestnik*. No. 2: 4–13.

RRIA (2009) The Water Strategy of the Agribusiness Complex of Russia until 2020. *Dukhov Russian Research Institute of Automatics (RRIA)*. Moscow.

Danilov–Danilyan V., Pryazhinskaya V. et al. (2006) *Rationale of Water Resources Management Strategies*. Moscow: Nauchny mir.

UNECE (1996) Protection of Transboundary Rivers. Manual for politicians and decision makers. *United Nations Economic Commission for Europe*. New York, Geneva.

UNECE (2009a) *Our W: Joining Hands across Borders – First Assessment of Transboundary Rivers, Lakes and Groundwaters*. UNECE. Geneva, 2009.

UNECE (2009b) Review of Efficiency of Environmental Activities (Second Review). Kazakhstan. Issue No. 22. *United Nations Economic Commission for Europe*. New York, Geneva.

UNECE (2009c) Review of Efficiency of Environmental Activities (Second Review). Kyrgyzstan. Issue No. 22. *United Nations Economic Commission for Europe*. New York, Geneva.

UNECE (2009d) Handbook on Water Resources and Adaptation to Climate Change. *United Nations Economic Commission for Europe*. New York, Geneva.

UNECE (2009e) Transboundary Flood Risk Management. *United Nations Economic Commission for Europe*. New York, Geneva.

Kolosov V. (2003) Theoretical Limology: New Approaches. International Processes. *Magazine of theory of international relations and practice*. V. 1. No. 3 (3). September – December.

Korzun V. (2012) *Climate Change: Reasons, Forecasts and Possible Implications for Global Economy*. IMEMO RAN. Moscow.

Lopukhov Y., Kireicheva L. (2011) Development of Land Reclamation in Russia. *Melioratsiya*. No. 1. Moscow.

MK (2008) Water Economy Systems Management in Emergencies. Materials of the international conference. Moscow. 4–5 June.

UN (2011a) Second Assessment of Transboundary Rivers, Lakes and Groundwaters. *United Nations*. New York, Geneva.

UN (2011b) Cities and Climate Change Initiative. Global Report on Human Settlements 2011. *UN Human Settlements Programme (UN-Habitat)*. London. Washington, DC.

Petrosov V. (2007) *Sustainable Water Supply*. Kharkov: Factor.

UNDP (2003) Environmental protection management handbook. UNDP Regional Bureau for Europe and CIS. *United Nations Development Programme*. Bratislava.

UNDP (2013) Human Development Report, The Rise of the South: Human Progress in a Diverse World. *United Nations Development Programme*. New York.

Pryazhinskaya V., Payevskaya H., Yaroshevsky D. (1993) *Some Conceptual Issues of Reorganisation of Water Management*.

Satunkin I., Sobolin G. et al. (2006) *Territorial Water Adequacy in Russia and CIS Countries*. Bulletin of the Orenburg State Agrarian University. No. 2.

CIS (1991) The Almaty Declaration. 21 December. Agreement Establishing the Commonwealth of Independent States. *Official website of the CIS Executive Committee*. Available at: www.cis.minsk.by.

CIS (2012) The Electric Power Sector of the Commonwealth of Independent States in 2001–2011. Collection. *The executive committee of the CIS Electric Power Council*. Moscow.

CIS Statistics Committee (2006) The Water Laws of CIS Member States and International Legal Regulation of Water Relations. *CIS Statistics Committee*. Almaty.

CIS Statistics Committee (2012) Investment Priorities of Cooperation in Transboundary River Basins of Central Asia. *CIS Statistics Committee*. Available at: www.cisstat.com. Almaty.

TD (2004) Integrated Flood Control. Concept document. Technical document. No. 1.

CSTI (2010) Land Reclamation in Foreign Countries. Scientific and technical review. Centre of Scientific and Technical Information *Meliovodinform* (CSTI). Moscow. Issue 1.

Schedrin V., Senchukov G. (2012) *The Prospects of Land Reclamation and Water Economy Development in the Russian Federation*. Scientific magazine of the Russian Research Institute of Land Reclamation. No. 1 (5).

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