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Degree of Master of Science

The role of the Interstate Commission for Water Coordination in fostering transboundary cooperation in the Aral Sea Basin, the case of the Rogun Dam construction

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Author's declaration

No portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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ABSTRACT OF THESIS submitted by:
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for the degree of Master of Science and entitled: The role of the Interstate Commission for Water Coordination in fostering transboundary cooperation in the Aral Sea Basin, the case of the Rogun Dam construction.

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The present study summarizes the historical evolution of institutionalization in the relatively young transboundary Aral Sea Basin with special emphasis to the main coordinating body of the Basin – the Interstate Commission for Water Coordination. The thesis includes: first, the review of the most relevant theories on transboundary water cooperation along with potential factors influencing effective management of shared river water resources; second, the features and description of the Aral Sea Basin with the chronology of emerging problems and attempts of solutions – agreements, establishment of institutions; third, the analysis of the current level of interstate water relations in the Basin with a specific focus on the role of the ICWC in fostering transboundary water cooperation; and finally, the case study of the most contentious and currently ongoing Rogun Project on the transboundary river Amu Darya – potentially highest dam in the world. The study has been completed mainly through archival research and interviews with competent scientists and authorities. Although there are numerous points of improvement in activities and policies carried out by the ICWC, the findings of the thesis are contrary to what is promoted by the ICWC itself and question the prestige of the ICWC as a reliable platform for long term transboundary water cooperation in the Basin.

Keywords: ICWC, Aral Sea, Amu Darya, Rogun, water allocation, transboundary river, transboundary water cooperation/conflict

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1. INTRODUCTION

1.1 Justification, aim and objectives

Given that there are more than 260 rivers shared by two or more countries (Wolf *et al.* 1999), transboundary water infrastructure is a regional public good with increasing importance especially in the light of an exponentially growing demand for water and water services in the world. The fact that over forty percent of the world population lives within transboundary river basins makes successful transboundary cooperation critical for poverty eradication, sustainable development and political stability (ODI 2002).

Home to roughly 60 million people, the Aral Sea Basin with its rich transboundary environmental challenges is almost a synonym to 'man-made environmental catastrophe'. Although the five basin countries, namely Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan moved towards a cooperative relationship by establishing the Interstate Commission for Water Coordination (ICWC) soon enough after the collapse of the Soviet Union (already in 1992), in 2005 the Central Asia Human Development Report shows that still 'None of the regional organizations in Central Asia have any power or mechanism to enforce regional agreements' (UNDP 2005). Many authors explain emerging disagreements and conflicts as a result of poor institutional settings and high regional interdependence, particularly in water allocation and water related energy production (Dinar *et al.* 2007; Wegerich 2008; McKinney 2004). These, in turn,

result in:

a) numerous violations of the agreements within the Basin; and

b) undermining the status of the ICWC as a reliable platform for long term cooperation.

The purpose of the thesis is to examine the potential of the ICWC in eliciting cooperation between riparian states, particularly in the case of the Rogun Dam construction – potentially the highest dam in the world located in the biggest river basin in the region.

The research is designed with the aim to provide an in-depth analysis of the role of the ICWC in fostering transboundary water cooperation. This includes:

a) understanding the theory of transboundary water cooperation and conflict, recent trends in the field and the role of institutional settings;

b) observing the evolution and the state of transboundary cooperation in the relatively young transboundary – the Aral Sea – basin by conducting archival research and in-depth interviews;

c) studying the ICWC, its original purpose and functions and present role in establishing basin-wide cooperative relations, particularly in the case of the Rogun Dam construction (ongoing at the moment of the research);

d) identifying major factors militating improvement of the current state of transboundary water cooperation in the Aral Sea Basin with particular focus on the ICWC.

1.2 Applied methodology

Methodology of the research includes:

Data gathering:

1) Archival research includes the revision of the literature on past and recent developments in the field of environmental security and cooperation, theories on water conflicts, and current transboundary water management practices and cooperation approaches. Sources for archival research have been the Scientific Information Centre of the ICWC, online research including the official web-portal of the ICWC and the Portal of Knowledge for Water and Environmental Issues in Central Asia, the Central Asian Irrigation Research Institute SANIIRI, libraries of Central European University, National University of Uzbekistan, Tashkent State University of Agriculture, Tashkent State University of Irrigation and Melioration and other institutions.

2) Interviewing scientists, stakeholders and activists in the field:

- Stakeholders from the Scientific Information Centre of the Interstate Commission for Water Coordination (SIC ICWC) (Dr. Vadim Sokolov, Deputy Director of the SIC ICWC and Dr. Anatoliy Sorokin, Chief of the Regional Water Management Department at the SIC ICWC have been interviewed).

- Scientists in the field from: Central European University; National University of Uzbekistan (Dr. Rashid Kulmatov has been the external supervisor for the master research);

Wageningen University, the Netherlands (Dr. Kai Wegerich, a leading expert in transboundary water issues in Central Asia, has been contacted and interviewed).

- Representatives from environmental NGOs in Central Asia, particularly experts from EcoMovement of Uzbekistan and National Association of NGOs in Uzbekistan have been interviewed (the names cannot be given due to interviewees' wish to remain anonymous).

- An expert from the Regional Environmental Centre in Hungary (Dr. Stephen Stec, Head of the Environmental Law Programme, has been interviewed).

Case study analysis:

In addressing the socio-economic issues, the crucial place is occupied by the Amu Darya River Basin, which has about 60% of water and 70% of hydropower resources of the region (Ibatullin *et al.* 2009). From this perspective, the case of currently ongoing construction of the potentially highest dam in the world – the Rogun Dam located in the territory of upstream Tajikistan has been analyzed. Different approaches used by the ICWC versus international scientists in evaluation of potential impacts on environmental, socio-economic and political stability of the Basin have been investigated. Most importantly, the case has been studied in order to determine the ICWC's role and its effectiveness as a coordinating and negotiating body between the riparians.

Research limitations:

The given methodology was chosen partially because it helps to achieve the objectives, and partially due to the possibility to get access to information. In this respect, risks existed with regard to the ICWC though, because of the present sensitive political context of the topic. This may have become an obstacle in accessing sufficient up-to-date information, however, if this proved to be the case, it would have been considered as an indicator of poor institutional transparency. Nevertheless, the rest of the research including decent amounts of already completed studies by international organizations and experts (UNDP, UNEP, UNECE, World Bank, ADB, etc.) as well as by national ones would have provided answers to the research questions.

2. UNDERSTANDING TRANSBOUNDARY WATER COOPERATION AND THE ROLE OF INSTITUTIONAL SETTINGS

2.1 Transboundary water cooperation and conflicts

The theory of transboundary water cooperation and conflicts suggests that due to the importance of water and its increasing demand-related scarcity, disagreements over shared water resources will be a leading source of conflict in the twenty-first century (e.g. Cooley 1984; Homer-Dixon 1991, 1994, 1999). For example, Homer-Dixon (1994), citing the Jordan and other water disputes, comes to the conclusion that "the renewable resource most likely to stimulate interstate resource war is water". A downstream state's objection to pollution, excessive irrigation, or the construction of dams by an upstream state, which will influence the quantity or quality of water available to the downstream state are the most common causes for disagreement over transboundary waters. Phillips *et al.* (2006) summarize that transboundary water conflicts emerge when "riparian states feel constrained in their ability to realise their national goals and objectives, generally as a result of one or more co-riparians unilaterally using the resource".

Haftendorn (2000) classifies all river conflicts as conflicts through use and conflicts through pollution, which is also supported by Moller (2005), who claims that downstream irrigation use versus upstream hydropower use is often a case of emerging conflicts. Lonergan (1997) suggests that the quantity of water is also a crucial factor in cases of intense political tensions and conflicts. Differently, Wolf (2003) implies that water conflicts are the result of improper international

settings, institutional capacities and the general levels of economic and social development in preventing conflict situations and achieving adequate resolutions.

In contrast, Hensel *et al.* (2006) argue that both water scarcity and institutionalization vary significantly across geographical regions of the world, which creates different local environments within which potential conflict arises. In other words, according to Hensel *et al.* (2006), first we should not observe the same patterns of conflict management across different geographical areas in the world, especially with respect to riparian conflicts, because there are significant regional differences in levels of freshwater scarcity. Second, resource poor areas create environments that are highly competitive, where the creation of institutions to manage conflict will be lacking and/or ineffective. Resource rich areas, on the other hand, will be faced with fewer potential conflict situations overall, which will enhance the prospects for the creation of institutions to establish cooperative relations. This suggests that there is a greater potential to develop institutions and effectively facilitate conflict management in resource abundant areas.

2.2 Resource/water scarcity and conflict

Water is a renewable resource in the sense that rainfall continually feeds ground water supplies. However, in addition to recent climate change implications, human consumption, irrigation, dams, and pollution of water sources, such as rivers, place serious demands on existing and future water supplies. Due to the high levels of population growth and technological development the demand for water has increased exponentially. It is predicted that these

population increases and growing economic productivity will lead to "continued degradation and depletion of rivers, aquifers, and other water resources" (Homer-Dixon 1999).

Critchley and Terriff (1993) make a similar argument: "Intensifying population growth, agricultural production, and economic development will place even more pressure on current water supplies in the coming years, increasing the prospects for conflict and violence."

They point to both direct and indirect linkages between resource competition and conflict, arguing that resources directly result in conflict when (1) they are becoming increasingly scarce in a common territory, (2) they are essential for survival, and (3) when they can be physically seized/controlled. Freshwater supplies drawn from rivers clearly meet these conditions; they are becoming scarce in many regions, they are obviously essential for human life, and it is possible to restrict the flow of rivers through the construction of dams or extensive irrigation projects (Sowers 2002).

In addition to studies linking environmental resources broadly with conflict, scholars have begun to focus their attention on water resources in particular. In the early 1980s, many authors published articles on so called 'water wars', particularly emerging in the Middle East (e.g. Cooley 1984). More recently, a number of researchers have analyzed the correlation between water resources and transboundary conflict. For instance, while Guner (1998) studies how distribution of water resources can influence terrorism and local conflicts, Toset *et al.* (2000) try to measure the impact of common river waters on interstate conflicts. Sowers (2002) analyzes the

relationship between shared rivers and militarized conflict, establishing the possibility that riparian conflicts vary significantly among regions in the world. Another finding suggested by him is that the intensity of international conflicts is related to water resources distribution. In brief, although there is not a great deal of systematic empirical studies showing direct relationship between cross border water resources and occurrence of transboundary conflicts there is an obvious consensus that competition over shared water resources is a potential for a interstate conflict.

2.3 Role of institutional settings

While Waterbury (1997) suggests that in order to provide the necessary infrastructure for the promotion and coordination of cooperation some "modest steps starting at the national level can nevertheless be attempted, (…) such as water pricing and technological innovation aimed at the achievement of more efficient water uses", among other authors, Daoudy (2007) emphasizes the need for "establishment of regional and international institutions".

Furthermore, Wolf and Hamner (2000) consider agreements and treaties as solutions for enhancing mutual confidence between parties. As a general framework, the 1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses establishes that the principles of equitable and reasonable utilisation, no significant harm, and prior notification of works should serve as guiding criteria for the management of international and transboundary waters (UN 1997a).

As Hensel *et al.* (2006) explain, one of the key problems limiting cooperation between states in the international system is the lack of an overarching authority to enforce agreements. On a national level, the government has the authority to enforce contractual relations whereas internationally, the lack of central authority makes states search other mechanisms to implement obligations. One of the options available for states is to create institutions. Naturally, these institutions do not enjoy the same amount of power as a government of a certain country on a national level; however, they provide a platform for dispute resolution and structure for enforcement of agreements. Generally, institutions can 1) suggest a potential solution to the transboundary water management problems; 2) monitor the compliance of respective treaty obligations; 3) set enforcement mechanisms (Sowers 2002); 4) provide neutral information and reduce uncertainty (Keohane 1984). Some institutions explicitly manage water-related conflicts, such as regional trade agreements in Africa (Powers 2004a, 2004b).

If there is an effective institution, a riparian conflict can be referred to this institution for resolution, which decreases the likelihood that the conflicting parties will use force. Institutions may also have a more passive effect on conflict management (Mitchell and Hensel 2007); by creating regular forums that facilitate bilateral negotiations between members and encouraging norms of peaceful conflict resolution (Russett and Oneal 2001).

The institution established between Canada and the United States in 1909 to manage transboundary water resources provides a great example of the benefits of river-specific

institutions. The International Joint Commission (IJC) works to resolve contentious issues raised by the riparians. Hensel *et al.* (2006) see the effectiveness of the IJC in its activities regulating the Great Lakes and coordinating numerous hydropower projects that involve both parties. Also, Hensel *et al.* (2006) believe that the membership of both states to a number of regional and global organizations that call for peaceful settlement of conflicts, such as the the United Nations, the Rio Pact, and Organization of American States. These shared institutional memberships create more general forums for peaceful negotiations over river issues. Thus, it can be assumed that institutions (river-specific or general) designed to manage riparian conflict will decrease the likelihood of militarized conflict, and increase the frequency and effectiveness of peaceful conflict management.

Based on above, it can be concluded that in order to foster cooperation in solving transboundary water conflicts, riparians need to go for negotiations, and interstate organizations can serve as a ground for this. Institutions may have several different but interlinked functions, such as monitoring, management, concluding and enforcement of agreements, or serving as a platform for initiating bilateral/multilateral negotiations. However, it should be taken into account that a level of water scarcity probably influences the possibility for river-specific institutions to be created or for existing institutions to have strong effects on member states' behaviour (Tir and Ackerman 2004).

3. TRANSBOUNDARY WATER COOPERATION IN THE ARAL SEA BASIN

3.1 The Aral Sea Basin: background, overview of conflicts

The collapse of the Soviet Union in 1991 automatically made one of the biggest environmental catastrophes - the problem of the Aral Sea's depletion - an issue of international relations for the countries of Central Asia. Also, several issues previously treated domestically, such as the management and utilization of the Amu Darya and Syr Darya Rivers (tributaries of the Aral Sea), became a new challenge for cooperation over transboundary water for the five newly established independent states - Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. Having understood the need for cooperation, these countries almost immediately (in 1991) initiated discussions on cooperative management of the transboundary water resources in the region, and as early as the 18th February of 1992 ratified "The Agreement between Republic of Kazakhstan, Kyrgyz Republic, Republic of Uzbekistan, Republic of Tajikistan and Turkmenistan on cooperation in the field of joint management with regard to water resources management and protection as applied to interstate water sources" (Dukhovny 2007). Although Dukhovny (2007) claims that "…national and regional water authorities managed to provide conflict-free water allocation and delivery necessary to meet water demands of countries in the basin", as it was noted before, in 2005 the Central Asia Human Development Report reveals that still "None of the regional organizations in Central Asia have any power or mechanism to enforce regional agreements". Furthermore, Dinar *et al.* (2007) state that "While numerous statements have been

issued by the riparian countries, the basin lacks a robust and comprehensive treaty". Therefore, the focus of this chapter will be the processes and factors militating against full cooperation in the Aral Sea Basin.

3.2 Features of the Basin

The area of the Aral Sea Basin exceeds over 690,000 km2 (Kirmani and Moigne 1997). The Basin is formed by the terminal lake Aral Sea and two largest rivers of Central Asia – the Amu Darya and Syr Darya Rivers (Fig. 1). Both rivers originate in the mountain glaciers: the Amu Darya in Tajikistan, with a relatively smaller contribution from north-eastern Afghanistan, and the Syr Darya in Kyrgyzstan. Three main ecological zones differentiated in the Aral Sea Basin are: mountains, deserts, and the Aral Sea with its deltas.

High altitudes with peaks over 7,000 m and high levels of precipitation reaching 1,600 mm annually are the main characteristics of the Tian Shan and Pamir mountains located in the south and south-west of the Basin and covered with large forest reserves and some national parks (Dinar *et al.* 2007).

Soil and temperature in the lowlands and valleys are favourable for agriculture. However, a significant part of the Basin area is covered by two large deserts – the Karakum and Kyzylkum with very low precipitation (below 100 mm annually) and high evaporation rates (Kirmani and Moigne 1997).

The Basin covers almost the entire area of Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan in

addition to the southern part of Kazakhstan, and the northern part of Afghanistan and Iran (Dukhovny *et al.* 2006).

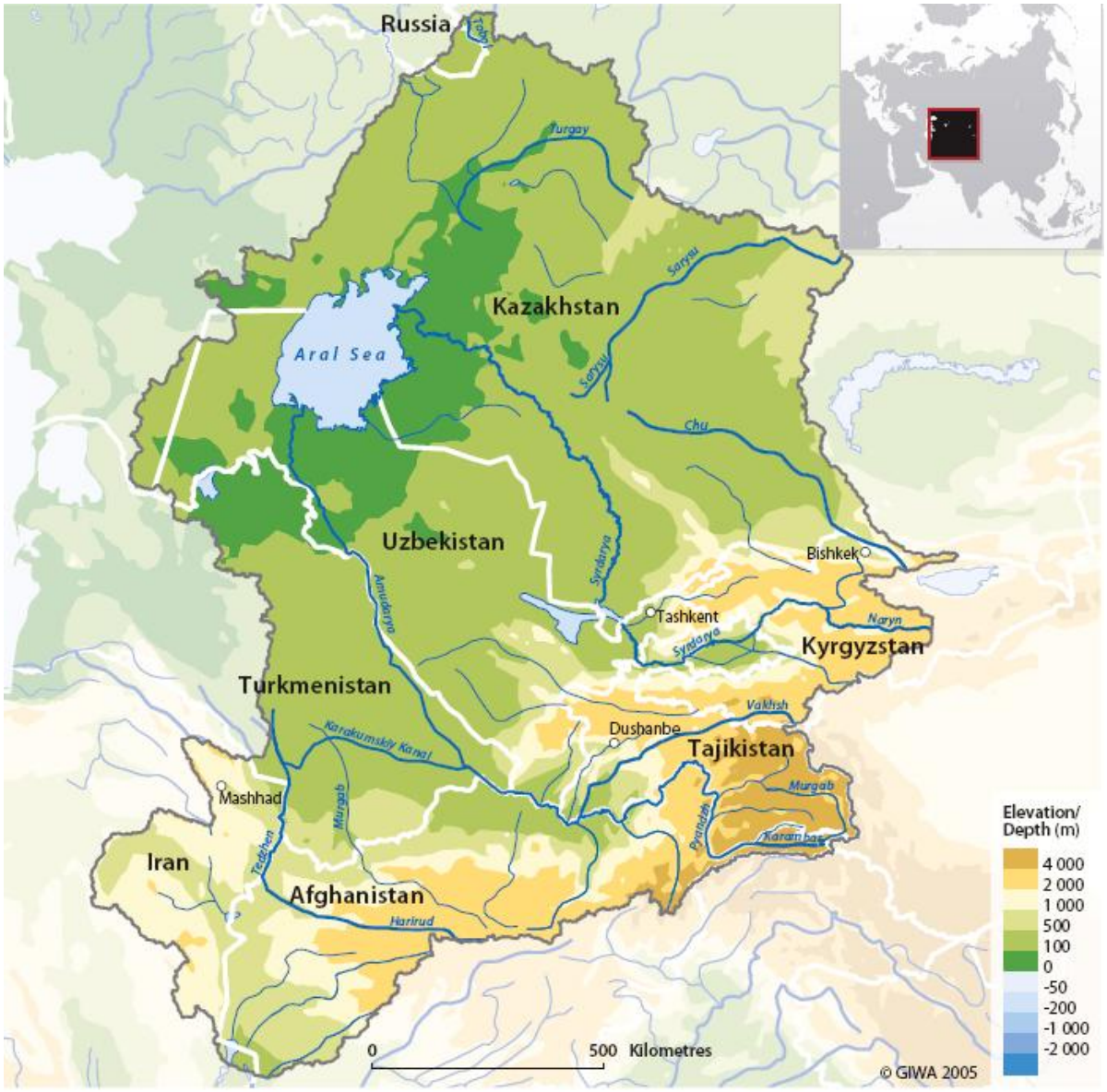

Fig.1. The Aral Sea Basin. Source: UNEP 2005.

The estimated total mean annual flow of the rivers is around 116 km3 (CAWI 2006). Also, around 35 km3 of groundwater resources is utilized in the Basin (Dinar *et al.* 2007). The contribution of Afghanistan and Iran amounts to 9% of the Basin's water resources (Table 1), however, they are not involved in the management of transboundary water resources of the

region.

Table 1. Aral Sea: mean annual runoff surface water contributions (km3/year).

Country	Contribution to river		Total water contributions		Total water use (km3)	Total water use for irrigation in 1994, km3 (% of total)
	Syr Darya km3	Amu Darya km3	km3	% of total		
Kazakhstan	2.5 [38.1][a]	0.0 [0.0]	2.5	2.2	11.0	9.7 (88)
Kyrgyzstan	27.5 [5.0]	1.6 [2.0]	29.2	25.2	5.1	4.6 (90)
Tajikistan	1.0 [6.2]	58.7 [12.0]	59.7	51.5	12.0	10.3 (86)
Turkmenistan	0 [0.0]	1.4 [43.0]	1.4	1.2	23.1	22.4 (97)
Uzbekistan	5.5 [51.7]	6.8 [43.0]	12.4	10.6	58.0	53.0 (91)
Afghanistan and Iran	0.0	10.8	10.8	9.3	0.0	0.0
Flows to the Aral Sea					7.9	
Total Aral Sea Basin	36.5	79.3	116.0	100	116	100.0 (86)

Source: Dinar *et al.* 2007. [a] Allocation during the Soviet regime

The Aral Sea, once the fourth largest inland water body of the world whose area exceeded 68,000 km2 up to the early 1960s, is a terminal lake situated in the Central Asian part of the former Soviet Union (Soliev 2009a; Fig. 1). With the volume of approximately 1000 km3 the maximum depth was 63 m, and the mean elevation of the Aral's surface above the ocean level was 53.5 m (Soliev 2009a). The Amu Darya and Syr Darya, originating in Tajikistan and Kyrgyzstan respectively, cross the borders of the five countries and Afghanistan several times on the way to

the Aral Sea (Soliev 2009a).

With mostly arid and semi-arid climate, the region is sparsely populated. Water related developments have been bringing a major income for the region for many years. For instance, about 8 million people lived in the Basin with around 3.5 million ha of irrigated land and network of irrigation canals already by 1900. By 2000 the population of the Basin has increased sevenfold, exceeding 50 million people with 7.5-7.9 million ha of irrigated land (IFAS-UNEP 2001).

Also, being a north-south shipping route the Aral Sea itself was an important source of income. For instance, fishery in the Aral Sea was a source for about 13% of the sturgeon catches in the former USSR (Soliev 2009a). The former ecosystem supported 24 game fish species, more than 300 species in the plankton, 60 species of zoobenthos (Soliev 2009a).

While pastures and tugay forests occupying around 250,000 ha in the Amu Darya delta were a natural barrier against soil erosion, they also hosted around 70 species of mammals and more than 300 species of birds that inhabited the river delta (Dinar *et al.* 2007; UNEP 2005). The Aral Sea had a moderating effect on the regional climate, providing moisture to the atmosphere. Also as Muminov and Ignatova (1995) indicate, such influence was observed in the riparian zone up to about 100 km from the shore.

Up to the end of 1950s, irrigated agriculture developments of the Basin did not reduce the rivers' discharge into the Aral Sea, because the areas involved in agriculture were primarily in valleys and river deltas, areas with abundant water. Moreover, grown agricultural crops were less water

demanding than the preceding plants which grew in the area. As a result, the water balance in the Aral Sea Basin was not affected (Dinar *et al.* 1995).

3.3 The problems

In the early 1960s, plans for massive extension of cotton production in the Aral Sea Basin aimed at improving economic conditions in the region and addressing food and fibre (cotton) security were developed and successfully realized by Moscow, which made it one of the largest cotton producing areas on Earth. This was done through the construction of thousands of kilometres of irrigation canals and the diversion of the waters of the Amu Darya and the Syr Darya rivers for irrigation purposes (Crighton *et al.* 2003) and thus directly influencing the water discharge into the Aral Sea.

For example, the Karakum Canal alone diverts 500 m3/s of water from the middle of the Amu Darya to Turkmenistan through the Karakum desert (Dinar *et al.* 2007). Around one-third of water used in irrigation in Turkmenistan percolates through the sandy soils of the canal. Moreover, significant seepage losses created an 800 km2 lake alongside the Karakum Canal.

Due to the decreasing river discharge, evaporative losses have become much larger than the freshwater inflows in the water budget of the Aral Sea. According to the data by UNEP (2005), irrigated areas in the Aral Sea Basin increased from 4.51 million ha in 1960 to 6.92 million ha in 1980 and to 7.85 million ha in 2000. In addition, the old irrigating networks and outdated methods of irrigation result in nearly 30% loss of water in the Basin annually (Kulmatov pers.

comm.). Taking into account that two rivers previously supplied almost 90% of the Aral Sea freshwater, obviously, this resulted in dramatic shrinking and significantly increased salinity since the 1960's (Khan *et al.* 2004; Fig. 2).

Despite the fact of the obvious shrinking and quality degradation of water increasingly leading to various health and other socio-economic problems, the Aral Sea catastrophe gained international attention only in the 1990s after the collapse of the Soviet Union (Dinar *et al.* 2007).

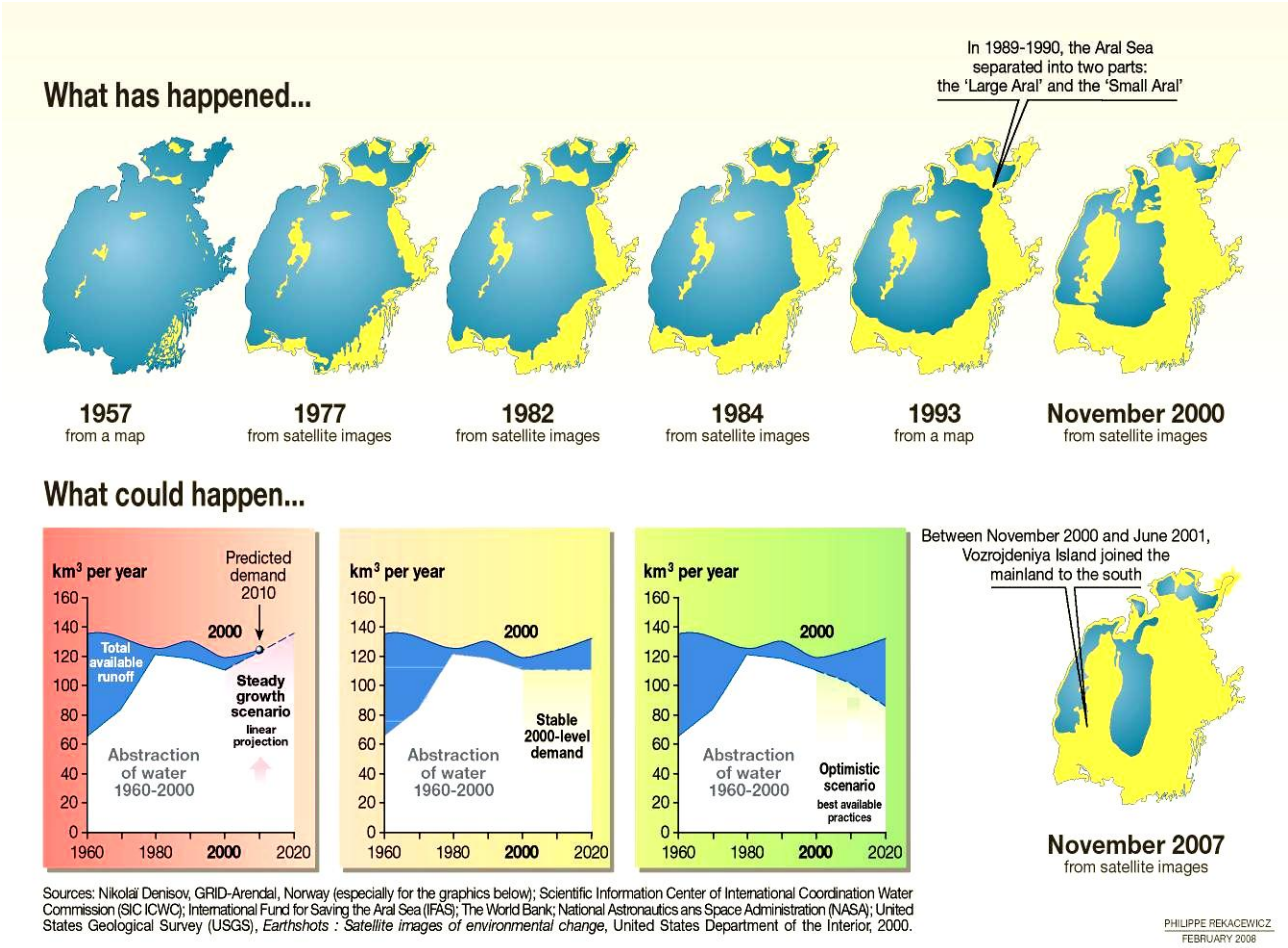

Fig.2. Chronology of the Aral Sea depletion. Source: UNEP 2008.

The responsible organization for water management - the Ministry of Water Management of the USSR – was totally and centrally in charge for hydropower and irrigation projects in the region

controlling water allocation, use and other issues related to all currently transboundary water resources in the Basin (Langford and Vinogradov 2001). According to Dukhovny *et al.* (2006), by the end of the 1980s, around 90% of 116 km3 water from the Amu Darya and Syr Darya was used for irrigation of cotton, rice and wheat (Dukhovny *et al.* 2006; Table 1). Three years after the independence the share of irrigation in total water use still remained very significant – estimated at 88, 90, 86, 97, and 91%, for Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan respectively (Dinar *et al.* 2007; see also Table 1).

The collapse of the Soviet Union made the downstream countries, still in need of huge water allocations to support their economies, considerably dependent on their upstream riparians, who could already control water releases unilaterally. Consequently, this created ground for conflict in the Basin and strengthened the need for cooperation (ICG 2002).

After independence, likewise, there was no more financial support to the region from Moscow. In addition, a strong dependence on irrigated agriculture, plus centralized hydropower systems did not allow the countries to make any rapid significant changes regarding water allocations. As Dinar *et al.* (2007) point out "...their point of departure was the same water allocations which was in place during the Soviet era". The following sections focus on respective regional agreements along with the evolution of negotiation and institutionalization in the Basin.

3.4 History of water related disputes in the Basin

Since previously applied monitoring and management methods and means were no longer

sufficient to control water resources in the region, and the demand for water was increasing, the allocation mechanism during the Soviet period became unsustainable for the five newly independent countries. The lack of enforcement and a common coordinating authority increased water allocation related tensions (Table 2). According to Dinar *et al.* (2007) and Mosello (2008), the conflicts that emerged in the region can be explained by the countries' "zero-sum" attitude where each country tries to maximize only its own benefit (water allocation) from the common good with no consideration for regional needs. The countries announced plans to reach self-sufficiency of their economies in many aspects in order to minimize dependence from any other country, which in the field of transboundary water relations was expressed in plans and actions on construction of new dams and reservoirs to increase internal storage capacity (Table2).

The Nurek reservoir in the north of Tajikistan and the Toktogul reservoir in the west of Kyrgyzstan are the two main reservoirs providing water for irrigated crops in the three downstream riparians - Kazakhstan, Turkmenistan, and Uzbekistan. While these three countries are rich in natural gas, coal and oil reserves, the source of more than an estimated 90% of electricity in upstream Tajikistan and Kyrgyzstan is based on hydropower generation (Soliev 2009b). In addition, these two countries claim the water originating on their territory to be the property of these two countries respectively (Dinar *et al.* 2007).

One of the important events in the region regarding transboundary water cooperation was the agreements signed in 1998 by Kyrgyzstan with Kazakhstan and Uzbekistan, on water swap for

coal and electricity (Dukhovny 2007). However, as Dinar *et al.* (2007) indicates, the exchange agreements lack two important elements: first, they do not specify the measurements of exchange (how much coal and/or electricity should be given in return for how much water released); and second, water release in extremely dry and wet years is not taken into consideration as a special case.

Failure to meet the targets leads to disagreements, particularly from downstream countries as to the volume of water to be released. On the other hand, upstream countries disagree on the volume of energy exchange. The UNDP report from 2005 shows that "during 1990 to 2000, summer releases declined to 45% and winter releases increased to 55% of the annual discharges", and the same report concludes that in 2002, after the annual swap agreements had been in force already for four years, "the implementation of the annual agreements made under the new framework proved unsatisfactory, and the reservoir (the Toktogul reservoir on the Syr Darya in Kyrgyzstan) once again reached an unsustainably low level".

These disputes resulted in significant shortages of water for irrigation of the agricultural sector in Kazakhstan and Uzbekistan where this sector accounts to nearly 20-30% of the GDP (Soliev 2009b). Consequently, water withdrawals for irrigation purposes, in turn, leave decreased water flow of the Syr Darya into the Aral Sea (Dinar *et al.* 2007).

Table 2: Water-related and other disputes among the Aral Sea Basin riparian states.

	Kazakhstan	Tajikistan	Uzbekistan
Kazakhstan			In 1997 Kazakhstan repeatedly blames Uzbekistan for cutting the water flow by 70%. Border disputes. Uzbekistan attempts to shift the border twice during this year. Disagreements over the terms of an energy swap agreement. Uzbekistan introduces visa regime for citizens of other member countries in the Commonwealth of Independent States (CIS), which makes trade between the countries difficult due to border shifts.
Kyrgyzstan	Kazakhstan fails to deliver energy under an energy swap agreement. Kyrgyzstan closes Toktogul reservoir. In 2001, Kyrgyzstan adopts a Law where it declares "water resources of Kyrgyzstan are its national heritage" – this means Kyrgyzstan declared itself as the owner of water bodies.		Kyrgyzstan cuts water flow from its reservoir when Uzbekistan does not agree to pay for water. In 1999 Uzbekistan deploys 130,000 troops on the Kyrgyz border to guard the reservoirs rid the area of 4000-10,000 Islamic Movement of Uzbekistan (IMU) and Taliban fighters who had infiltrated the area. Ownership dispute over the reservoir on the border of Kyrgyzstan and Uzbekistan. Border disputes. Dispute over energy swap agreement. Uzbekistan places mines along the border with

			Kyrgyzstan to prevent the illegal movement of IMU fighters from the territory of Kyrgyzstan. Uzbekistan introduces visa regime for citizens of other member countries in the CIS, which makes trade between the countries difficult due to border shifts.
Tajikistan	At the request of Kazakhstan, Tajikistan releases water every time Kazakhstan faced difficulties with irrigation of fields even though it suffered great losses.		Ethnic tensions rise in the north of Tajikistan where Uzbeks reside. Political tensions escalate due to civil war in Tajikistan. Uzbekistan introduces visa regime for citizens of other member countries in the CIS, which makes trade between the countries difficult due to border shifts.
Uzbekistan		Uzbekistan asks Tajikistan to release water downstream in exchange for electricity and gas in winter. Disputes erupt between Tajikistan and Uzbekistan due to Uzbekistan's failure to comply with agreed terms.	

Source: Adopted from Dinar *et al.* 2007.

3.5 Regional power and politics

The previous section with the summarized disputes demonstrates the level of complicity of the relationships and interdependence among the Basin countries. Also, the indicators given in Table 3 show that there are factors influencing regional power that might partially explain the emerging disputes and behaviour of the five countries.

Table 3. Demographic and economic indicators of the Aral Sea Basin states, 1992, 1995, 2000.

Indicators		Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Population (million)	1992	16.7	4.4	5.3	3.7	20.5
	1995	16.7	4.6	6.0	4.6	23.1
	2000	16.1	4.9	6.1	4.7	24.9
GDP per capita (US$)	1992	1690	520	740	2088	517
	1995	1263	331	407	940	446
	2000	1515	399	386	1377	485

Source: Dinar *et al.* 2007.

Although Uzbekistan used to be an administration centre in implementing, coordinating, and controlling all orders regarding regional issues in Central Asia directed from Moscow, after the collapse, it became very difficult to forecast which country will take the regional leadership. As Dinar *et al.* (2007) suggest, while Kazakhstan, Kyrgyzstan, and Tajikistan can be categorized as more active states with a will to cooperate in regional issues, Uzbekistan and Turkmenistan seem to have more closed policies, sometimes unilaterally deciding not to participate in regional meetings. Nevertheless, Kyrgyzstan and Tajikistan have relatively little influence due to their high

dependence on energy imports from downstream Kazakhstan, Turkmenistan and Uzbekistan. While Kyrgyzstan, who can control the significant part (up to 70%) of the annual flow of the Syr Darya, acts primarily on its own interest, Tajikistan with much less influence (30%) on the annual flow of the Amu Darya tries to maintain friendly relations with all the Basin countries (UNDP 2005).

Table 5. Regional power relations and behavioural pattern

State	Political power within the Basin and behavioural pattern
Kazakhstan	Strong, often acts as mediator in basin disputes
Kyrgyzstan	Medium, but acts in its own benefit. Plagued by ethnic and political unrest since 1990, suffered revolutions in 2005 and 2010
Tajikistan	Weak, adopts a friendship framework. Fell into civil war immediately upon gaining independence (among liberals, pro-Communists and Islamists)
Turkmenistan	Adopts a neutrality policy
Uzbekistan	Strong, considers itself a regional leader yet often acts unilaterally on different regional matters

Source: Adopted from Dinar *et al.* 2007

Despite its abundant water resources and huge hydropower capacity (4% of the world deposits), interestingly enough, Tajikistan itself suffers from an annual energy consumption deficit of 3.0 to 3.5 billion kWh, which is one of the primary reasons of Tajikistan to finish the Rogun Dam project initiated in the Soviet time. The case of the Rogun Dam construction will be discussed in more detail in the next chapter.

3.6 Climate change implications on water resources

According to Dukhovny *et al.* (2008), forecasts have indicated minor changes (± 2…4 %) in water resources by 2025-2030 due to climate change implications. However, the authors give more impressive figures for the long-term, i.e. beyond 2030- as much as 10% and more. More importantly, they claim that climate change will strongly influence the frequency of extreme floods and droughts. The authors conduct their evaluation through a comparison of hydrographs of the Amu Darya and Syr Darya over last 17 years against the previous 40 years (1990…2007 vs. 1950…1990, Fig.3 and 4).

Run-off of the Amu Darya and its tributaries over the last 17 years averages 69.2 km3. This is one km3 less (only 1.5 %) than the mean long-term annual value over 1950-1990, but practically similar to the mean long-term flow of 69.3 km3 over the whole observation period (1911-2007). Low- and high-water years in the Amu Darya Basin have become more frequent over the last 17 years as compared to 1950-1990. The frequency of low-water years (75 % probability and higher) has increased 1.3 times, while that of high-water years (25 % probability and lower) has become 1.2 times higher , and for extremely high-water years (10 % probability and lower), 2.5 times higher.

Run-off of the Syr Darya and its tributaries over the last 17 years has averaged 41.6 km3/year. This is 3.4 km3 (or 8 %) higher than the mean long-term and annual values over 1950-1990. If we compare mean annual flows in the Syr Darya over the 17 years with the mean long-term flow

of 37.6 km3 over the whole observation period 1911-2007, an increase in flow will be even more (10 %) for the 17 years.

Frequency of low-water years in the Syr Darya Basin over the 17 years has not become higher as compared to 1950-1990; however, high-water years (25 % probability and lower) are 1.4 times more frequent , and extremely high-water ones (10 % probability and lower), almost twice as frequent.

The "depth" of extremely low-water years increased 1.5 times (i.e. deviation of the mean flow in low-water years from that over the period). Thus, in the recent years, not only floods (for all the rivers) and low-water periods (for the Amu Darya) have become more frequent but the amplitude of deviation from the mean values has increased as well.

Dukhovny *et al.* (2008) assert that the magnitude of fluctuations is so large that the regulation by the Charvak reservoir cannot lessen the flood load, and vice versa, capacities of the reservoir cannot compensate the deficit for irrigation in an extremely low-water year even, not to mention environmental needs and particularly hydropower and water supply.

In addition, the authors particularly point out that water consumption will increase 15-20 % by 2030 in all scenarios.

Concerning the Aral Sea depletion (Fig. 2), although many researchers believe that natural climate change has also played a considerable role, and the lake surface level would have dropped even without an increase of anthropogenic water overuse (e.g. Bortnik and Chistyaeva 1990), these

authors admit that climate change is responsible for only one-fourth of the level drop, and the remaining 75% are direct consequences of human activities (Zavialov *et al.* 2009).

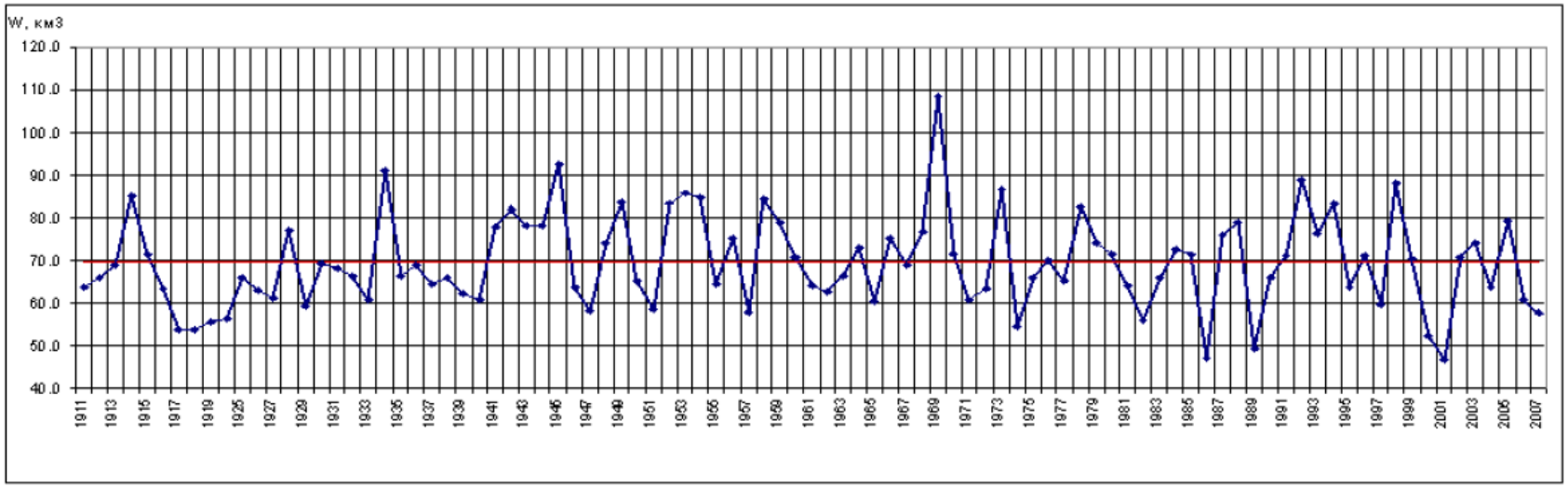

Fig.3. Natural flow of the Amu Darya river (km3). Source: Dukhovny *et al.* 2008

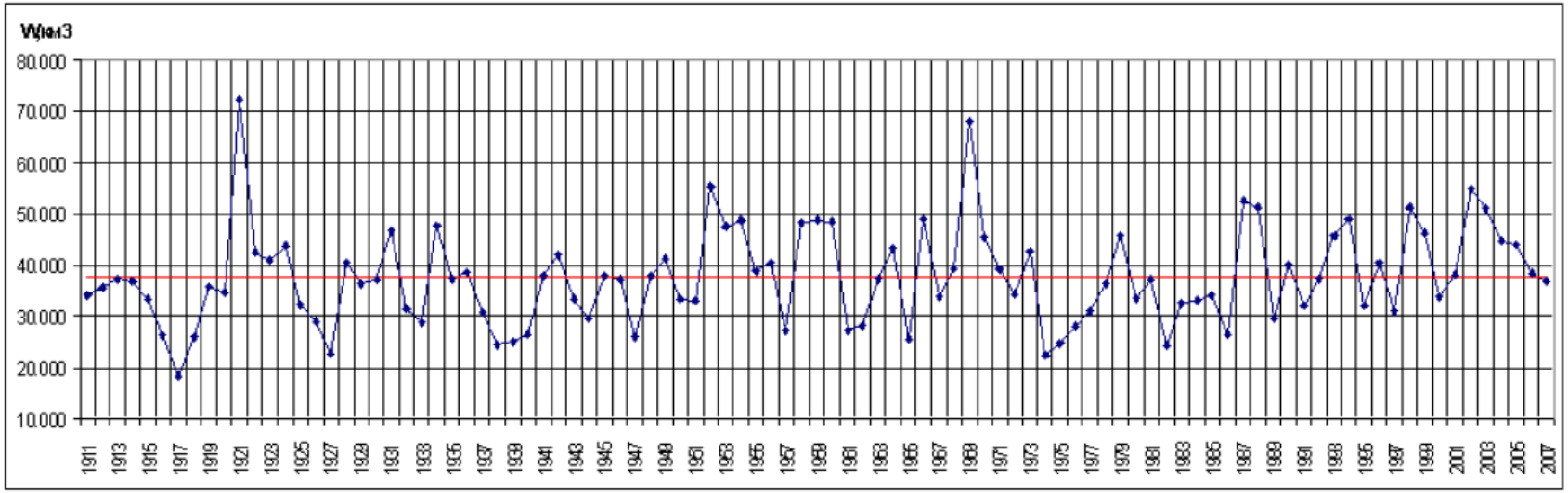

Fig.4. Natural flow of the Syr Darya river (km3). Source: Dukhovny *et al.* 2008.

3.7 The way to the ICWC: agreements, aims and objectives

There were international agreements during the Soviet time regarding transboundary waters in the region. They were on joint management and utilization of the Amu Darya River, which formed the border between the USSR and Afghanistan. Three agreements, one in 1946, and two in 1958, established a joint commission for discussion of respective international water issues, defined water allocation regime on the Amu Darya (9 km3 for Afghanistan and the rest for the Soviet Union), and set up ecological and environmental standards, including exchange of data on water level and volume, pollution prevention, flood warning system and other issues (Ahmad and Wasiq 2004; Votrin 2006). However, after the independence of the former Soviet countries, Afghanistan has not been involved in negotiation and management of the transboundary waters of the region and is not a party to institutions coordinating these issues.

The first institutions created directly to deal with waters of the Amu Darya and Syr Darya were two Basin Water Management Organizations (BWO) established in 1986. The main purpose of these BWOs was to ensure implementation of plans approved by the Ministry of Water Management of the Soviet Union (Dukhovny *et al.* 2006).

According to de Chazournes (2006), in order to reach the current structure after 1991, the institutional framework of the Basin should have gone through a great deal of changes and agreements.

The starting point of negotiations was the Almaty Agreement signed in 1992 and the creation of

the Interstate Commission for Water Coordination (ICWC) by five Basin countries.

The Almaty Agreement signed by the Water Ministries set water allocation as it was during the Soviet time until the states would reach an agreement on new allocation quantities acceptable by all parties. While this condition was in favour of downstream irrigation states, it did not consider any allocation for Afghanistan (O'Hara 2004).

Also, the creation of the ICWC was a result of the Almaty Agreement. The objective of the ICWC has been to sustain the Basin water resources while developing and adopting a single water policy that meets the interests of each state. The management and monitoring of water allocations are responsibilities of the ICWC as well. In turn, the re-established Amu Darya and Syr Darya BWOs report to the ICWC and make recommendations on water developments for their respective Basins (Langford and Vinogradov 2001).

In addition, between 1993 and 1995 among management organizations created for supporting the Aral Sea Basin regulation, there were the Interstate Council on the Aral Sea Basin (ICAS) aimed at working out policies and proposals for the Aral Sea Basin management (Peachey 2004); the International Fund for the Aral Sea (IFAS), formed to coordinate financial and funding activities (Mukhammadiev 2001); the Sustainable Development Commission (SDC) initiated to integrate socio-economic aspects into the new policies developed by the ICAS, and the Executive Committee of the ICAS (EC-ICAS), which was responsible for implementation of the Aral Sea Basin Program (ASBP) (Dinar *et al.* 2007).

The ASBP was initiated in 1994 to bring together international organizations such as UNDP, UNEP, the World Bank, and the EU in order to identify long-term solutions for the Basin's problems on water management, environment, rehabilitation of the disaster zone around the lake, etc. Another important function of the ASBP is capacity development of the Basin states to realize these programs (World Bank 1998).

According to Langford and Vinogradov (2001), distinction between roles and functions of the ICAS and the ICWC, as well as between ones of the ICAS and the EC-ICAS was not clear, which was reported in a number of reviews. In 1997, the five Basin countries responded to this by restructuring the institutional framework, forming a new IFAS as a result of combining the ICAS and the previous IFAS. Also, already the EC-IFAS (previously EC-ICAS) together with the ICWC and the SDC were to report straight to the board members of the new IFAS. According to Dinar *et al.* (2007) newly established institutional framework and the ASBP are one of the most significant improvements in the history of the Aral Sea Basin-wide cooperation.

Between 1995 and 2003, the Basin countries adopted four declarations (IFAS 2006):

1. In 1995 the Nukus Declaration clarifies financial obligations of the states to the IFAS, ICAS, and the SDC while emphasizing sustainable development in the Basin.
2. In 1997, the Almaty Declaration announces 1998 as the Year of Protection of the Environment in Central Asia, and promotes an eco-system approach in the water management of the Basin.

3. In 1999, the Ashgabat Declaration accentuated the need and support for joint actions to deal with common environmental problems in the Basin (Roll *et al.* 2006), and initiated the Water Resources and Environment Control Project aimed at better use of water and other environmental resources.
4. In 2002, the Dushanbe Declaration sets the main directions for addressing the problems related to the Aral Sea, and for improving information exchange and monitoring on water and other natural resources (Dinar *et al.* 2007).

Besides, it is worth highlighting bilateral and multilateral agreements related to two main transboundary rivers of the Aral Sea Basin – the Amu Darya and Syr Darya. The irrigation and hydropower plans of the Soviet Union made the region become a huge complex water storage system. In fact, this system built on the Amu Darya and Syr Darya was aimed to store water in winter for use in the subsequent summer for downstream irrigation and electricity generation. One of the problems after the collapse of the Soviet Union is still the issue of operation and maintenance of existing water storage/hydropower infrastructure. The Framework Agreement addressed this issue stating that the state where the infrastructure is located is the owner, while the liability for the management activities should be shared among riparians (de Chazournes 2006).

In order to solve remaining problems, the countries applied annual bilateral and trilateral agreements. Given that Tajikistan (upstream on the Amu Darya) was suffering from civil war

which weakened its potential to participate in negotiations, most of the annual agreements were concluded on joint utilization of the Syr Darya water resources.

In a long term perspective, these agreements did not really become a reliable framework which could consider objective compensation mechanisms from the downstream to the upstream riparians for released water.

Need for a more formalized and predictable framework which could more effectively arrange water – energy trade-offs found its realization at the Toktogul hydropower dam in Kyrgyzstan which controls the release of water from the Syr Darya to the downstream riparians. In 1998, the Prime Ministers of Kyrgyzstan, Kazakhstan and Uzbekistan signed the Syr Darya Framework Agreement, also referred to as the Bishkek Agreement (de Chazournes 2006). Because of its civil war Tajikistan joined the agreement later in 1999.

The treaty defined that Kyrgyzstan should be compensated by the downstream Kazakhstan and Uzbekistan for the costs of maintaining the infrastructure related to water storage in winter seasons and timely release in summer time (McKinney 2004). Also, the agreement considers the value of released water. According to the Article IV of the agreement, energy losses coming from reduced water releases during winter period shall be compensated with coal, gas, and electricity, or their monetary equivalent. In addition, compensation should also include operation and reconstruction costs of the hydropower facilities.

Another important point is that the treaty declares that the four states will seek

agreement on construction of new hydropower facilities.

Dinar *et al.* (2007) discuss this barter agreement and challenge it asking whether or not it is fair that Uzbekistan pays more than Kazakhstan for the same amount of water and power, and that the downstream countries pay for release of water at all. Sorokin (pers. comm. 2009), Chief of the Regional Water Management Department at the SIC ICWC, claims that, in principle, given that the Syr Darya is a transboundary river while utilization of which the riparian countries should apply international norms, those countries interested in a change of the natural flow of the river should be charged. Therefore, according to Sorokin, Uzbekistan and Kazakhstan who are more interested in sustaining the release regimes close to natural flow of the river should not be charged (natural flow: abundant release during vegetative period and small release during winter time).

On the other hand, in 2001, the Kyrgyz Parliament introduced a national law which declares water resources as a national property of Kyrgyzstan. According to this law, even if Kyrgyzstan agrees that downstream riparians are entitled to a certain share of the river, Kyrgyzstan believes that their use has been excessive, and therefore, it is fair to request monetary compensation for additional water (Heltzer 2003).

In 2002, Uzbekistan and Tajikistan adopted a Power-Trade Relations Agreement on utilization of Amu Darya water (de Chazournes 2006). This Barter agreement while integrating water and energy policies provided a platform for energy swaps from different sources. For instance,

Tajikistan delivers 3.4 billion kWh ($170 million) of hydropower to Uzbekistan from the Amu Darya dams and receives 3 billion kWh ($130 million) of electricity per year from Uzbekistan in the form of natural gas (Dinar *et al.* 2007). Although it seems both sides are in favour of this arrangement, as UNDP (2005) reports, the bilateral trade on the Amu Darya river basin is not without its problems. First, because Tajikistan's inability to pay results in cuts of gas supplies from Uzbekistan, and second, because the technical facilities are very old the low pipeline pressure makes gas supplies not reliable.

Finally, there are a number of regional organizations to which Central Asian countries belong (Fig. 5). As it was noted in Chapter 2, this should have influenced the level of transboundary cooperation in the region positively. However, the study by UNDP (2005) summarizes that the impact of these organizations on the level of regional cooperation has been limited (weak) and explains it by the following reasons:

- Incomplete membership (for example, Turkmenistan is a member of the CIS and ECO, and has not been an active participant even in these organizations).
- Not clear and overlapping objectives and mandates of the organizations that change over time.
- Very limited financial resources and weak organizational capacities, and lack of mediation/enforcement authority for the agreements reached.
- Lack of systematic support by the international community for sustainable financial

and technical assistance of regional cooperation.

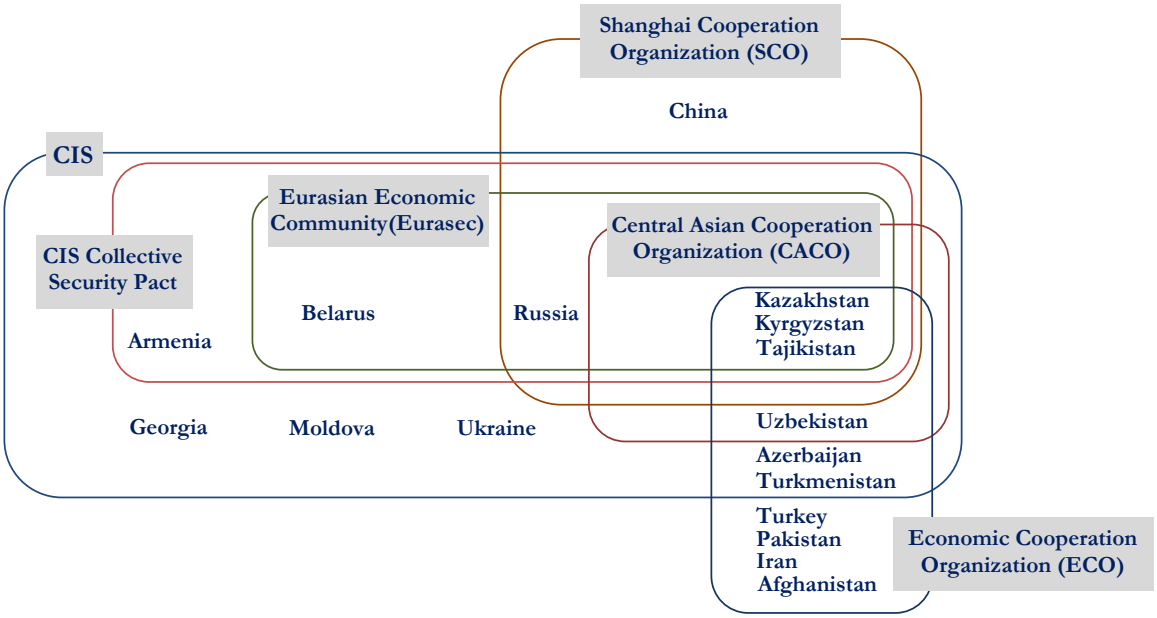

Fig.5. Selected regional organizations to which Central Asian countries belong. Source: UNDP 2005.

Dinar *et al.* (2007), similarly, note that the riparian states have shown little willingness to establish and participate in multilateral frameworks, having preferred bilateral, case-by-case solutions instead. However, while such a strategy may have reduced the impact of regional cooperation initiatives, according to Just and Netanyahu (1998), case-by-case approach has also prevented interstate crises from escalating into open violent conflict.

3.8 Structure, functions and responsibilities

The present structure of the main international organization responsible for transboundary water management and cooperation in the Aral Sea Basin is illustrated in the Fig.6. The ICWC consists of the heads of Water-Economic related Ministries of the five Basin countries, and its activities are implemented by its executive bodies: the BWO Amu Darya, the BWO Syr Darya, the

Scientific Information Centre (SIC ICWC), Secretariat, the Coordinating Hydrometeorology and Training Centres (Dukhovny 2007).

Created before independence and integrated to the structure of the newly established ICWC, the BWOs Amu Darya and Syr Darya are responsible for the day-to-day operation of the main water supply facilities in the two Basins. The SIC ICWC, according to its Status approved in 1996, is the body which prepares and scientifically justifies drafts of decisions for the ICWC, thus, it might be concluded, is the main executive body in the structure.

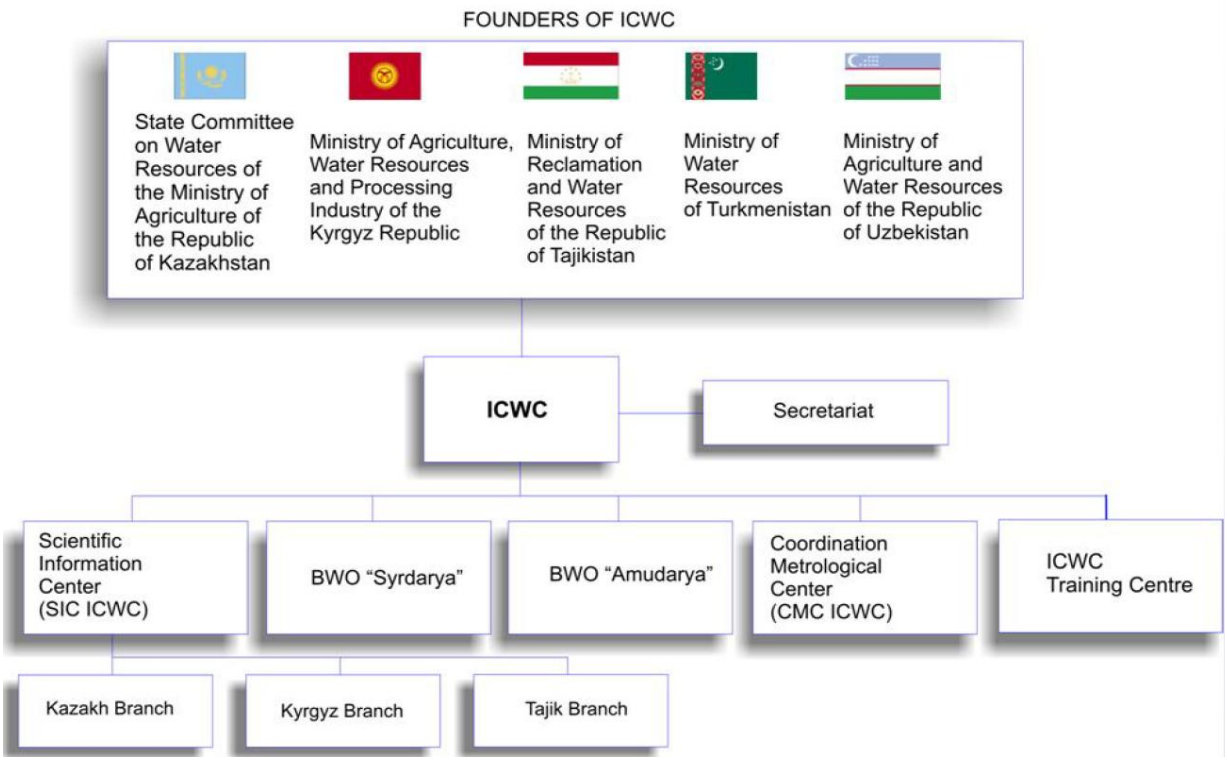

Fig.6. Structure of the ICWC. Source: Dukhovny 2007.

Based on forecasts by the Coordinating Hydrometeorology Centre, the BWOs prepare water allocation plans for ICWC approval. The water allocation to each country is established in accordance with previously mentioned schemes devised during Soviet times. As McKinney (2004) claims, when it comes to the Aral Sea, the allocated water is based primarily on the principle of

"whatever is remaining". The author states that neither water quality nor its quantity is monitored on a country level by the BWOs since their role mainly consists of regional flow monitoring. In addition, according to McKinney, the fact that both of the BWOs are located on the territory of Uzbekistan casts doubts on objectivity of information provided by them.

The ICWC is to report to the IFAS the main function of which is to attract outside resources to coordinate and finance regional programs to overcome the problems associated with the desiccation of the Aral Sea. In 1997, former ICAS (created to manage regional programs) and IFAS were merged and streamlined as a new IFAS under the rotating chairmanship of the president of one of the five member states. The new IFAS' primary activities include:

- Raising funds for joint measures to conserve the air, water, and land resources of the Aral Sea Basin, as well as the flora and fauna;
- Financing
    - Interstate ecological research, programs, and projects aimed at saving the Aral Sea and improving the ecological situation in the region surrounding the Sea as well as resolving general social and ecological problems of the region;
    - Joint studies and scientific-technical efforts to rehabilitate the ecological balance, establish efficient use of natural resources, and manage transboundary waters;
- Establishing a regional environmental monitoring system in the Aral Sea Basin;
- Participating in implementing international programs on saving the Aral Sea and improving

the ecology of the Basin.

An IFAS Management Board, consisting of Deputy Prime Ministers from each member country, also was formed. The Board develops priority measures for alleviation of the Aral Sea problems and organizes and coordinates the implementation of all regional programs associated with the problems of sustainable development in the Aral Sea Basin countries.

4. THE PRESENT ROLE OF THE ICWC IN TRANSBOUNDARY WATER COOPERATION

4.1 Evaluation of the ICWC

4.1.1 Aims and objectives of the ICWC: objectivity

One of the achievements of the Almaty Agreement in 1992 was that it initiated development of the Statute of the newly established ICWC signed by the all five founders later the same year. The Statute of the ICWC establishes general description of the ICWC, its goal, main objectives, structure and activities, rights and obligations and the order of the status change or activity cessation. This document was further revised and re-signed by the member states on September 18, 2008 along with the newly signed Provision about rotation of the executive bodies of the ICWC and their heads: Secretariat; Basin water organization "Amu Darya" (BWO "Amu Darya"); Basin water organization "Syr Darya" (BWO "Syr Darya"); Scientific Information Centre for water related problems (SIC) and its national branches; Coordination Metrological Centre (CMC) and national organizations; Regional Training Centre (RTC) and its branches (ICWC 2010).

There are several points regarding the objectivity of decisions and activities of the ICWC that are challenged by international academics. One of the main criticisms summarized by McKinney (2004) is that while "the operation modes of hydro systems in the Aral Sea Basin are determined and approved by the ICWC without participation of the energy sector; the operation plans are implemented by the energy sector without participation of the water sector". When I verified this claim with the information presented by the ICWC on its official web-portal it turned out to be

true. However, Viktor Dukhovny, Director of the SIC ICWC, in his report in 2007, addresses this issue and proposes to integrate the energy sector into the activities of the ICWC and establish the Water-Energy Consortium that, particularly, will represent the interests of the Energy sector. According to Dukhovny, this Water-Energy Consortium should: 1) coordinate energy resources in the region so that they compensate decisions on water allocations; 2) ensure energy security for the countries and population in the region; 3) serve as a platform for attracting investments to development of new transboundary hydropower projects. Also, it is highlighted that establishment of such Consortium within the ICWC will allow countries to implement water release decisions directly, whereas at present, the ICWC only recommends release regimes and national energy agencies coordinate implementation after approval on a national level which results in delays sometimes till June (quite long after April – start of vegetation period) (Dukhovny 2007). Yet, I failed to find information on the follow up of this proposal and the questions - whether such Consortium will be created and if yes, when - remain unanswered.

Another important concern pointed out by McKinney (2004) is that while the BWOs (BWO Amu Darya and BWO Syr Darya – executive bodies of the ICWC) have the status of interstate organizations, both BWOs are located in Uzbekistan and the staffs of these organizations are formed exclusively of citizens of Uzbekistan, and rotation of management staff or recruitment of specialists from other member states is not practiced. Furthermore, Wegerich (pers. comm.)

argues that this condition provides Uzbekistan with control over data which, in turn, is used to gain favourable decisions of the ICWC for downstream countries. Wegerich proves his statement by providing several cases where data presented by the ICWC differs from what is given in studies by international organizations and international scholars.

On the other hand, perhaps as a response to this concern, in 2008 Almaty meeting, the ICWC signs the Provision on rotation of executive bodies of the ICWC and their heads. According to the Article 3 of the Provision:

"State-Founders make rotation of executive bodies' host-places for 5 years according to the following pattern:

Executive body	**Host country**
SIC ICWC	Kazakhstan
BWO "Amu Darya"	Turkmenistan
BWO "Syr Darya"	Tajikistan
CMC ICWC	Kyrgyzstan
Secretariat	Uzbekistan
Regional Training Centre	Kyrgyzstan"

This is, no doubt, a big step in increasing transparency in data collection and decision making within the ICWC activities. However, I have looked through the articles on rotation terms for the heads of the executive bodies and found out this:

Table 6. Analyses of the rotation terms of the heads of the ICWC executive bodies

Article in the Provision	**Finding**
Secretariat. Article 5.2. Upon termination of the term of office and after making decision on replacement	Given that hosting country will rotate every five years as per Article 3, this article

(rotation), one of candidates nominated by the ICWC member representing State-Founder, which hosts Secretariat, is appointed Head of Secretariat by ICWC decision.	eliminates the possibility of appointing the head from the same country for more than one rotating period.
BWO. Article 6.3. Upon termination of the term of office and after making decision on replacement (rotation), a representative of one of State-Founders, who meets the above requirements, shall be appointed this post.	This article reserves the possibility of appointing the head from the same country despite of rotation of the hosting country.
SIC. Article 7.2. Upon termination of the term of office and after making decision on replacement (rotation), a representative of one of State-Founders, who meets the above requirements, shall be appointed Director SIC.	This article reserves the possibility of appointing the head from the same country despite of rotation of the hosting country.
CMC. Article 8.2. Upon termination of the term of office and after making decision on replacement (rotation), one of candidates nominated by the ICWC member representing State-Founder, which hosts CMC, is appointed Director CMC by ICWC decision.	Given that hosting country will rotate every five years as per Article 3, this article eliminates the possibility of appointing the head from the same country for more than one rotating period.
RTC. Article 9.2. Upon termination of the term of office and after making decision on replacement (rotation), one of candidates nominated by the ICWC member representing State-Founder, which hosts RTC, is appointed Director RTC by ICWC decision.	Given that hosting country will rotate every five years as per Article 3, this article eliminates the possibility of appointing the head from the same country for more than one rotating period.

It is not explained why in two cases (SIC ICWC and BWOs) out of five an assigned head can be a representative of any five countries whereas in the rest three cases (Secretariat, CMC, RTC) a head must be nominated by the representative of the hosting country. This theoretically leaves the chance for any member country to nominate a candidate for the head posts of the SIC and two BWOs despite the location. Coincidently, these very organizations are responsible for data collection and preparation of draft decisions on water allocations for the ICWC approval.

4.1.2 Principles promoted by the ICWC for Basin Water Management

According to Dukhovny (n.d.), ICWC promotes following three general principles in Basin Water Management:

1) right on equitable and reasonable water use with regard to previous use;
2) 'do not harm'; and
3) polluter pays.

As the focus of the present research is rather allocation than pollution, first two principles have been examined against policies and activities carried out by ICWC in practice, as they directly concern the allocation matters in the Basin unlike the principle #3.

Principle #1 directly deals with the main issue in the Basin – water allocation. Although reference to the water allocations during the Soviet Union seems to be reasonable, obviously it is a serious advantage for the downstream irrigation countries that used to receive major part of water allocations. Having set this kind of principle, it is quite convenient to justify allocation decisions even if upstream countries have objections. In addition, according to this principle, those riparians who are more efficient with their allocated rights are allowed to expand their irrigated areas – as it focuses on water allocation schemes determined during the Soviet period (Wegerich pers. comm.).

Besides, the principle promotes "equality of representativeness, consensus, transparency, treaties, parity, equality in participation" (Dukhovny n.d.). However, one of the contradicting points to

this principle is that while being a part of the Basin, Afghanistan remains uninvolved in any issues regarding the Basin water management.

In 1987 the Scientific and Technical Council of the Ministry of Water Resources of the USSR formally determined allocations from the Basin water resources to the four Basin riparians. Allocation for Afghanistan was not taken into account even though in 1977 an Afghan delegation was sent to Tashkent to negotiate a joint water use agreement that claimed 9 km3 of the Amu Darya River flow annually (Wegerich pers.comm.).

At present, the ICWC describes the allocation to Afghanistan as "integrative" (Dukhovny n.d.). However, after almost two decades, neither Afghanistan nor Iran, both contributors to the Amu Darya River run-off, is a member of the ICWC. Dukhovny and Sokolov (n.d.), director and deputy director at the SIC ICWC respectively, admit the importance of Afghanistan, nevertheless, argue that the Afghanistan's economy is not ready for participation: "There are strong arguments for involving Afghanistan in the activities of the ICWC. […] In our view, this potential problem may become reality in ten or twenty years time, when the economic situation in Afghanistan has stabilized".

On the contrary, Horsman (2008) suggests another explanation: "Afghanistan's membership could upset the status quo and especially the downstream states' interests. It is unlikely therefore to gain membership as it potentially challenges the interests of the two IFAS members with most at stake, Turkmenistan and Uzbekistan".

Hence, it can be concluded that principle #1 is not neutral at the first place, and in reality does not consider the right on equitable and reasonable water use by the all riparian states as it claims.

Principle #2 – 'do not harm' - suggests that water sharing should not be viewed as a zero-sum game, where one country's gain is another's loss. While promotion of this principle reflects the 1992 UN Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes, and the 1997 UN New York Convention on the Law of the Non-Navigational Uses of International Watercourses, unfortunately, none of the treaties/agreements in the Basin is legally binding and ICWC itself does not have sufficient mandates to enforce application of this principle. Moreover, though in its reports the ICWC often refers to the principles of the UN Conventions, only Kazakhstan is a party to the Helsinki 1992 since 2001, and Uzbekistan is a party to the both since 2007 (UN 1992, 1997b).

Only some conflicts described in the Table 2 illustrates that there is a way wider set of factors that influences the Basin water cooperation/non-cooperation, which includes: a) the political context - recent independence of the Basin states and weak leadership at the governmental level; b) the economic context - economic policies focused on gaining self-sufficiency and tensions between agricultural and energy sectors of the countries; c) the social context - increasing population growth and tensions between ethnic groups.

These factors significantly diminish likelihood of efficient interstate water cooperation which is reflected in weak influence of the 'do not harm' principle promoted by the ICWC.

Besides, in principle, 'do not harm' when applied to transboundary water resources, obviously, is in favour of downstream countries as downstream countries physically cannot 'harm' water resources of the upstream countries, at least, through controlling water flow.

4.2 The case study of the Rogun Dam on the Amu Darya River Basin

4.2.1 The Rogun: to be or not to be?

The Rogun is a hydropower dam on the Amu Darya River Basin (Fig.7), construction of which started in 1970s during the Soviet Union and seized before completion in the beginning of 1990s due to the Civil War in Tajikistan where it is located and later had to be temporarily abandoned due to lack of financing as Moscow no longer funded the project after collapse of the USSR in 1991. Tajikistan is the poorest country in the CIS, it is ranked 159th in the world according to its GDP per capita (Kazantsev 2008). Tajikistan is not rich in fossil fuels and imports around 1.2 billion m3 of gas annually for internal needs, major part of which comes from Uzbekistan. While Tajikistan has the highest hydropower potential in the region (more than half of the total for Central Asia), due to low development of the infrastructure the country suffers from electricity scarcity especially during winter times (Kazantsev 2008).

Nowadays, Tajikistan is actively contemplating the ways its huge hydropower potential can be exploited – only 10 % of which has been deployed by now. Potentially the highest dam in the world (335 m) - the Rogun project is a 3,600 MW storage scheme, full completion of which can

liquidate electricity shortages in the country and even create electricity surpluses for exporting (UNDP 2005).

However, there are several factors that significantly influence the plans of Tajikistan and keep them from implementation, and I divide them into two groups:

1) National capacity: lack of funding (incremental cost of the project is around USD 3.5 billion), lack of proficient construction and hydropower specialists and companies. Nevertheless, there is a political will, which, one can assume, would be sufficient to find necessary investors outside the country. At this point, the second group of factors play a significant role.

2) International constraints: downstream Uzbekistan and Turkmenistan are highly opposed to construction of the Rogun Dam. As the UNDP report in 2005 explains, the primary reason for that is the full control that Tajikistan will obtain over the river flow. If Tajikistan uses the Rogun in an energy regime (abundant releases during hydrological period - from October through March; and storage mode during vegetation period – from April through September), obviously, downstream Uzbekistan and Turkmenistan will lose a great deal of agricultural production based on irrigation from the Amu Darya River. But how does it influence other potential investors? In 2004, the Russian Aluminium Company "RUSAL" signed an agreement with the Government of Tajikistan on completion of the Stage I (out of total three Stages) construction of the Rogun Dam (Wegerich pers.comm.). However, under the pressure of Uzbekistan, first, during the meeting in Moscow in 2008 and later during another meeting in

Tashkent in 2009, Russia announced that it will not participate in construction of transboundary projects unless concerns of all countries in the region are considered (Najibullah 2010).

Fig.7. The Amu Darya River Basin with Rogun and Nurek Reservoirs.
Source: adopted from Wegerich *et al.* 2007.

Perhaps, it can be explained by the fact that, these years, Uzbekistan and Russian Federation signed a number of significant agreements in strategically important fields of cooperation such as energy trade, transport and communication, military-technical manufacturing, etc. (Kremlin.ru 2008). All in all, Tajikistan lost one of its biggest and most potential investors while, as UNDP report 2005 indicates, international donors are hesitant due to the whole complex of political,

economic and social factors in the region. UNDP Human Development Report 2006 on global water crisis, particularly, comes to the same conclusion: "Tajikistan has the potential to become the world's third largest producer of hydropower. But it is held back because lack of cooperation between countries makes international financial institutions reluctant to lend for hydropower projects."

Tajikistan, despite the national and international constraints, has continued seeking solutions to resume the construction of the Rogun Dam. After refusal from Russia to cooperate, the Government of Tajikistan called on people and businesses of the country to purchase the shares of the Rogun Hydro Energy Plant joint-stock society to raise estimated USD 1.4 billion which would be enough to complete Stage I and II (Najibullah 2010).

However, as Wegerich *et al.* (2007) argue, due to respective storage capacities that Rogun reservoir will obtain at the each stage, completion of neither Stage I nor Stage II will allow Tajikistan to control the river flow and only completion of the Stage III would put Tajikistan in full control of the Vakhsh Basin (the Vakhsh river is one of two main tributaries of the Amu Darya, where the Rogun is situated, see Fig.7&8). Therefore, Wegerich *et al.* (2007) conclude that "...only Stage III could be interpreted by Uzbekistan or Turkmenistan as a potential threat to their agricultural production."

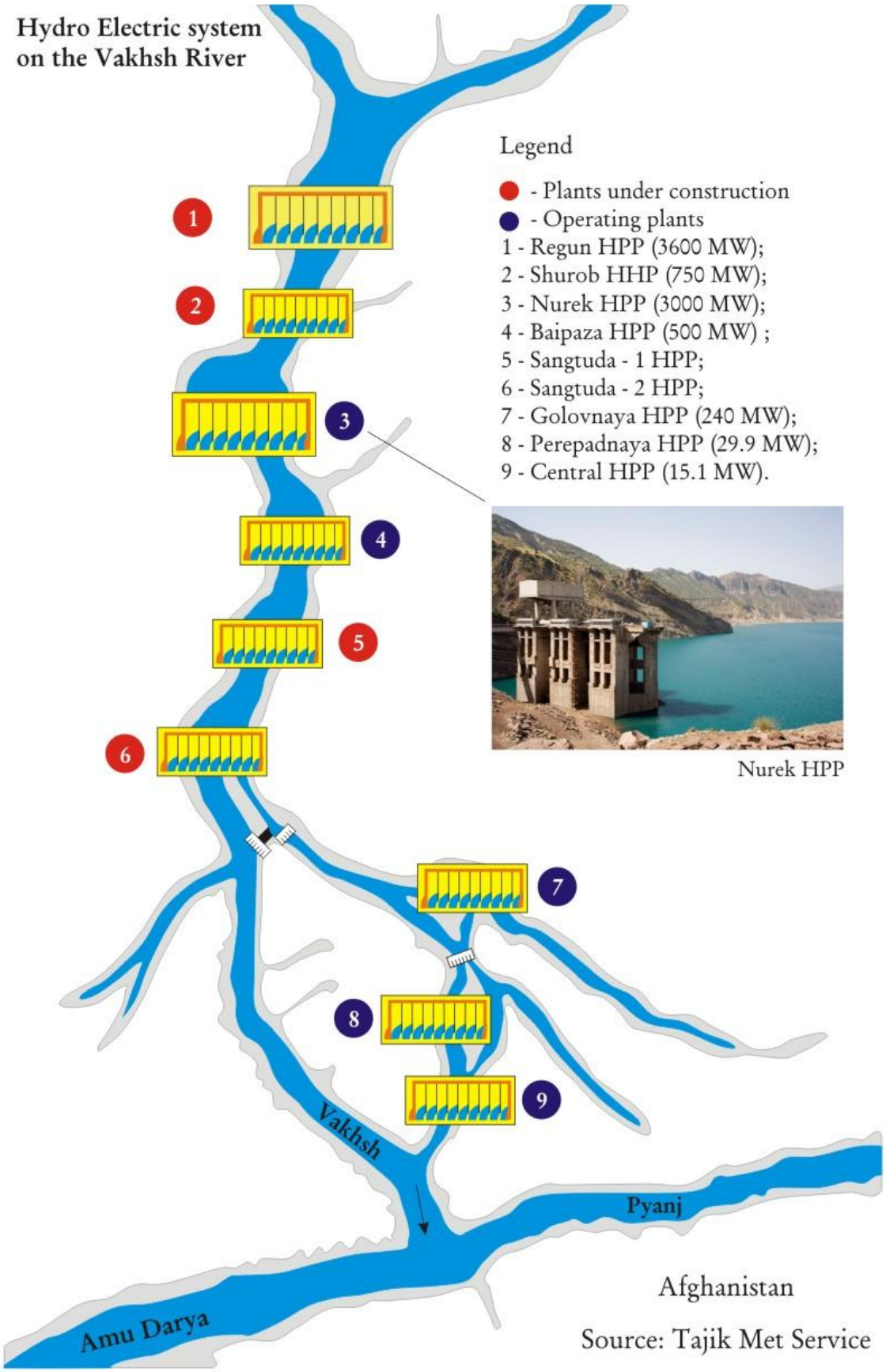

Fig. 8. Current and planned hydropower facilities on the Vakhsh River.

Source: adopted from Wegerich *et al.* 2007.

On the other hand, the Ecological Movement of Uzbekistan (a representative of the Movement-anonymous interviewee; Kulmatov pers. comm.) based on its own independent study asserts that there will be irreversible consequences for the downstream countries at any stage of the Rogun Dam construction. Reasons are primarily explained by two facts: a) impact on the river flow, especially with an energy regime, which will lead to loss of irrigated areas, land degradation, lower discharge to the Aral Sea during vegetation period, particularly, exacerbating environmental, social and health situation in the near Aral areas; and b) construction of the Rogun project started more than 40 years ago and was seized for a quite long time after independence, this, in turn, casts doubts on technical reliability of the project raising safety issues, especially given that the Dam is situated in the seismic active area with a risk up to 9.0 magnitude earthquakes (Kulmatov pers.comm.).

In response to concerns of Uzbek side, Tajik Water and Irrigation Institute states that Tajikistan already conducted a scientific study "taking into consideration environmental, seismology, water and other issues" (Najibullah 2010), I assume, implying that the all aspects of construction are under control and there is no reason for worrying. However, no material on this study is accessible online and no information is available on whether the study results have been shared with counterparts.

Overall, coming back to the question, to my mind, it is more likely "to be" than "not to be" because of the following reasons:

- First of all, there is a clear political will, which is a strong driving force to continue seeking funds and all other necessary means to complete the Rogun.
- Second, there is a demand for electricity and huge potential to produce it as discussed earlier.
- Finally, Tajikistan seems to ignore concerns of downstream Uzbekistan and Turkmenistan, and in the meantime continues with construction works.

4.2.2 What has been/is the role of the ICWC?

Stec (pers. comm.) believes that the most important question on construction of a transboundary hydropower facility is the mode of operation of the whole cascade of the Basin reservoirs that needs to be agreed between riparians. The research results proved Stec's statement.

Based on feasibility study of Lakhmeyer International hired by RUSAL, the ICWC, namely the SIC ICWC, in 2007, prepared "Evaluation of the impact of the Rogun Reservoir on the Amu Darya River water regime" (Dukhovny and Sorokin 2007). This is a comprehensive document which includes detailed background information, hydrological analyses of the river flow, various scenarios for different (irrigation, energy, combined) regimes at different height of the Reservoir (see Fig.9), and potential respective socio-economic and environmental consequences for each developed scenario in case the Rogun hydropower plant starts to operate.

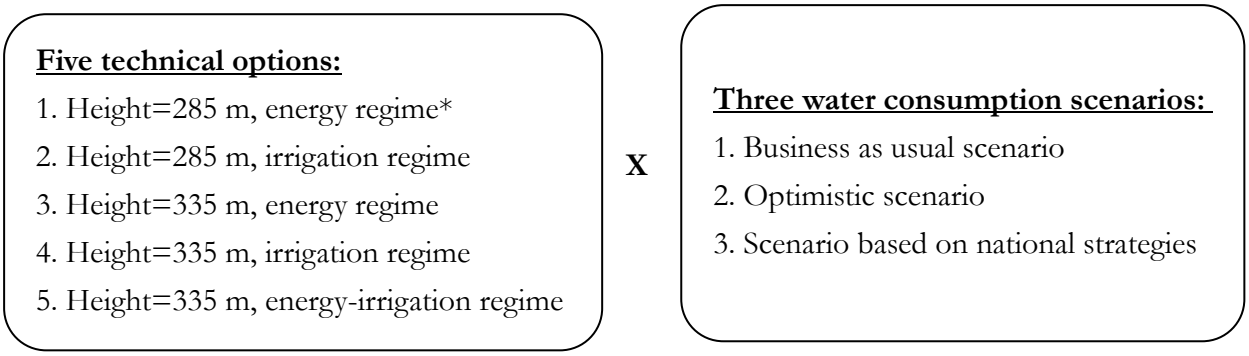

Fig. 9. Fifteen options considered by the SIC ICWC for evaluation of the Rogun impact.

*Regimes in the figure above apply to the cascade of two reservoirs – the Rogun (upstream) and the Nurek (downstream) (see also Fig.8). By energy regime authors mean that both the Rogun and the Nurek will be operating in the energy regime – actively releasing water during winter to meet increased seasonal demand for electricity, and storing water during summer for winter release purposes. On the contrary, irrigation regime means that both of the Reservoirs store water during winter and release during vegetation period. Finally, the combined regime suggests that Rogun operates in the energy regime, while the downstream Nurek will store and compensate water releases from the Rogun and operate under irrigation regime.

The 127 pages long evaluation document gives a very detailed explanation on methods of evaluation and calculates possible losses and gains for economies of separate Basin Zones, water provision for the River delta and the Aral Sea, and provides estimates on electricity production (Dukhovny and Sorokin 2007).

For instance, the table below summarizes the impacts of the Rogun construction on socio-economic indicators for the period 2005-2055 under business as usual scenario.

Table 7. Comparison of impacts of different regimes and technical options of the Rogun project on socio-economic development indicators for the period 2005-2055, USD mln. /year.

Options	Annual losses in irrigated areas and agricultural production	Decrease (-) or increase (+) in annual losses comparing to the current operation regime of the Nurek Reservoir, including the input from electricity production	Electricity production by the Rogun, monetary equivalent	Total gain comparing to the present regime of the Nurek Reservoir
Current regime of the Nurek Reservoir	94.71	-	-	-
Energy regime at 285 m height	211.3	116.59	162.35	45.76
Energy regime at 335 m height	174.6	79.89	194.71	114.82
Irrigation regime at 285 m height	59.2	-35.5	159.39	194.89
Irrigation regime at 335 m height	37.85	-56.86	188.41	245.27
Energy-irrigation regime at 335 m height	76.18	18.53	194.84	176.31

Source: Dukhovny and Sorokin 2007.

Analyzing the Table 7, as the Government of Tajikistan aims to maximize the gains from electricity production, I consider that the option 'Energy regime at 335 m height' would be the most desirable for Tajikistan. However, 'Energy-irrigation regime at 335 m height' brings the same electricity production, at the same time providing annually USD 61.36 mln. less losses comparing to application of the energy regime (79.89 – 18.53=61.36). This suggests that it is

possible to reach win-win solutions for all parties. Tajikistan can maximize its gains from electricity production while downstream countries can receive necessary amount of water for their agricultural production.

Besides, in a conversation on June 9, 2009, Dr. Vadim Sokolov, Deputy Director of the SIC ICWC, noted that there are overall 6 options out of tested 15, where the Rogun Dam construction and its future operation will satisfy the needs of the riparians in all aspects: bring profit through production of electricity for Tajikistan; timely provide water for irrigation needs of downstream Uzbekistan and Turkmenistan, and ensure environmental safety providing water for the River delta and the Aral Sea in comparison to the current situation.

Given this, it is interesting why, particularly, Uzbekistan is still opposed to construction of the Rogun Dam (Najibullah 2010). Dr. Anatoliy Sorokin (pers. comm. 2009), Chief of the regional water management department at the SIC ICWC, explains that – it is highly likely that Tajikistan will have to operate its hydropower facilities under the energy regime (both the Rogun and the Nurek) in order to pay back the investments in case it involves investments outside the country. Besides, in some resources, Uzbekistan claims that it is not opposed to construction of the Rogun, unless there is a comprehensive independent evaluation. As an alternative the President of Uzbekistan suggests switching to smaller and more feasible hydropower stations (UN 2010). After all, analyzing the role of the ICWC in coordinating, particularly, this issue, I find out that none of the parties – neither upstream Tajikistan, nor downstream Uzbekistan and Turkmenistan

refer to the evaluation conducted by the ICWC, whereas all of these countries are participating members of the organization and all of them several times claimed that there is a need to thoroughly evaluate the possible impacts of the Rogun Dam construction and operation.

5. CONCLUSIONS

As we started analyses from the theory on the role of resource/water scarcity in establishing effective transboundary water cooperation, having analyzed the Aral Sea Basin it can be concluded that there is definitely more demand than supply of water in the Basin. The question is whether this gap between demand and supply can be determined as scarcity. To my mind, the answer is no, at least because of the following findings:

1) consumption levels and water dependence: e.g. only irrigated areas in the Basin increased from 4.51 million ha in 1960 to 7.85 million ha in 2000;
2) efficiency in irrigation methods: e.g. ineffective irrigation methods and old irrigating infrastructure result in nearly 32-33 km3 (around 30% of total river flows of the Amu Darya and Syr Dayra) water loss in the Basin annually;
3) level of cooperation in the Basin: countries tend to maximize own benefits without consideration of the interests of the riparians/the whole region, which puts extra pressure on water availability.

Consequently, the above conditions create artificial scarcity of water resources, which I suggest to name as irrational use and inefficient cooperation. I think the only point that more realistically suggests an objective reason for the possible scarcity is the climate change implications on water resources in the region. However, according to the authors who analyzed the Aral Sea depletion, only 25% of the level-drop can be explained by the natural climate change whereas the rest is the

result of human activities. Thus, this is an originally water abundant region and the level of water scarcity is not a root reason for the low level transboundary water cooperation.

Besides, as to the international settings that might influence the cooperation level, the research has not been able to undermine the statement claimed by the UNDP report 2005 that there is no institution capable to enforce agreements in the region. Therefore, during the rest of my research I focused mainly on identification of the role of the ICWC rather than its ability to enforce the agreements.

In addition to the factors explained by the resource scarcity and the role of institutional settings, I think it is important to note that a very significant role in effective transboundary cooperation is played by historical background. In our case, while downstream refers to the historical regime, rapid change of which would be very devastating for its economy and lives of people used to have abundant and timely water releases, upstream as a sovereign independent party refers to the future, arguing that it has a right to and there is a huge need to deploy resources of the country to create better living conditions in the country. However, both of the approaches do not take into consideration some vital points. Downstream keeps referring to the historical background when justifying its need whereas it does not seem to change its consumption patterns. Upstream keeps referring to its needs that can be met only by deploying hydropower resources of the country whereas it seems to ignore internationally recognized norms and standards on use of transboundary water resources.

The latter conclusion perhaps is the main reason why only some downstream riparians became parties of the two UN Conventions – Helsinki 1992 and New York 1997 – on use of transboundary water resources. Uzbekistan joined to both of the Conventions in 2007 and Kazakhstan to Helsinki 1992 in 2001.

The ICWC often refers to the articles of the Conventions, however, during my research I have been unable to find out any mechanisms to influence/convince/motivate parties to join them. Moreover, a member state of the ICWC – Kyrgyzstan adopts a law where it declares water resources in the territory of the country as "its national heritage". Similarly, the Tajik Law states that "water is the exclusive property of the state". The mentioned Kyrgyz and Tajik Laws as well as the Uzbek water law adopted in 1993 neither recognize the ICWC as a body or platform for interstate cooperation/dispute resolution nor refer to any of its provisions.

It is figured out that the main role of the ICWC is establishment allotments of annual water releases. In order to do so the ICWC makes decisions based on predictions and justification of its executive bodies, mainly of the Scientific Information Centre and two Basin Water Management Organizations – the Amu Darya and Syr Darya. Scientists and researchers claim that there is a significant lack of data in the region, however, within the present research I can conclude that there is a huge amount of information available by now, there are constraints rather with transparency of data collection as the mentioned three executive bodies of the ICWC are located in Uzbekistan and their staff exclusively comprise of Uzbek citizens.

However, in 2008 the ICWC adopts new provisions on rotation of its executive bodies and heads of executive bodies. This should have cleared all the questions on transparency and objectivity of the ICWC activities and provide every member state with an opportunity to be in charge with monitoring and data collection; nevertheless, within the present research I came across the fact that the provisions have left a room for avoiding rotation in particular scenarios where the heads might be selected from any (i.e. as well from the same) country despite the rotation of location of executive bodies. Apparently, it works exactly with these three executive bodies that are responsible for monitoring, data collection and scientific justification (2 BWOs and SIC). Therefore, it is still not clear whether these provisions on rotation will bring necessary changes in improvement of transparency in monitoring and data collection, and objectivity in decision making.

From organizational and structural point of view, the ICWC needs participation of the energy sector in its activities. There are at least two obvious reasons for this: 1) the decisions made directly influence the energy sector defining how much hydropower can be produced in certain periods; and 2) eventually, the water allocation decisions are implemented by the respective national energy agencies. The ICWC itself recognizes this necessity in its report (Dukhovny 2007), however, there is no information on follow up on integration of energy and water sectors in the structure of the ICWC.

Besides, one of the main issues actively argued by the international scientists and scholars is

nonparticipation of Afghanistan in the ICWC. While in the earlier two points the ICWC tries to react positively and find possible solutions (rotation provisions, energy sector integration), regarding Afghanistan it is rather in no hurry to involve the politically and socio-economically unstable party. Nevertheless, I believe that as a contributing country and as a receiving country, obviously, Afghanistan should be involved in the activities of the ICWC. Of course, we have to admit, the situation is not stable, but there might be other ways of involvement, for instance, the ICWC could develop a set of requirements for Afghanistan to become a party (perhaps first on observation, then on a full membership terms). Clearly, there is a need to study this issue within a separate research in order to suggest more comprehensive conclusions.

Also, the Rogun case study analyses showed that the ICWC has a very limited impact in negotiation of the transboundary constructions. An important step by the ICWC has been taken to influence the situation: the Committee, more specifically its main executive body – the SIC have studied the Rogun situation and analyzed possible scenarios for its construction and future operation impacts. Even though the evaluation conducted by the ICWC provides win-win solutions (6 options out of 15 examined within the evaluation) for both upstream and downstream riparians, parties still have not come to a common agreement on this issue.

Overall, the above factors significantly undermine the status and prestige of the ICWC as the single interstate authority in the Aral Sea Basin that should play the most important role ensuring participation of all parties and enforcing agreements concluded within the scope of its activities

that definitely influences the overall basin-wide stability.

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