NeWater

TRANSBOUNDARY RIVER BASIN MANAGEMENT REGIMES: THE AMU DARYA BASIN CASE STUDY

Background report to Deliverable 1.3.1

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1 Introduction – aims and structure

This report intends to provide an overview of transboundary issues in the Amu Darya River Basin in Central Asia as contribution to work package 1.3. on transboundary water management regimes of the NeWater project.

NeWater research is aimed at identifying new approaches to more adaptive strategies in water resource management. In the inception phase, current water management regimes in a number of selected case study basins are described as a basis for the development of further research agendas on the transition towards adaptive management schemes.

The Amu Darya basin has been selected as a one of the river basins for further analysis in the context of the NeWater project. While studies prepared by WP 1.2 on the issue of governance, institutions and participation mainly focused on the structure of water management in some of the riparian states of the river basin, WP 1.3 specifically focuses on examining the interplay of different policies, institutions and countries in international river basins, the existing problems and challenges in such basins as well as current and possible future strategies for possibly improving the situation.

Water management in the Amu Darya basin, such as in its 'sister' basin the Syr Darya and the encompassing watershed of the Aral Sea basin, is heavily influenced by the transboundary course of the river. In addition, water management is closely intertwined with the agricultural and energy sectors in the region, which remains in a state of transition towards new political stability and statehood after the collapse of the Soviet Union in the early nineties. As a result of the prevailing cotton monoculture, water bodies in this region are in a dire environmental state. These water quality issues, but above all water use rights allocation among the riparian states creates a constant potential for conflict in the region.

Agreements have been achieved at the international level over the past year, in many cases with facilitation of the international donor and NGO community. Still, there are considerable shortcomings due to, among other factors, the inefficient and inadequate exchange of information among the riparian states, lacking transparency and involvement of relevant stakeholders of policies at the national and international level as well as the dominance of old structures, networks and mindsets.

This report aims to provide an introductory description of these factors as well as a brief assessment of the adaptiveness of the regime in the Amu Darya basin as a basis for the further work in NeWater. This will entail the development of a research agenda for investigating and addressing some of the most pressing issues from a governance perspective in close collaboration of the NeWater partners active in the case study area with the goal of contributing to the process to more adaptive water management in the basin.

The following text is guided by a reporting template designed to address the main aspects of a transboundary basin regime: the set-up of institutions and the interplay of different actors as well as all issues related to the generation, dissemination and use of information for river basin management.

1.1 Basin description

1.1.1 Geography

The Amu Darya situated in Central Asia is the largest tributary in terms of run-off to the Aral Sea. The basin is divided into high mountain areas of the Pamir-Alai-System and desert areas of the Turan Plain that consists of the Kzylkum desert in the East and the Karakum desert in the West. The basin borders in the North on the Usturt-Plateau, which drains to the Caspian

Sea. The length of the Amu Darya is 2,540 kilometres from the river source of Pyandj – the main tributary to the Amu Darya – to its delta. The catchment area covers more than 300 thousand square kilometres, without taking into account the Zerafshan river catchment[1].

The head rivers Pyandj and Vaksh originate in the high mountains of Kyrgyzstan and Afghanistan. The Vaksh comes from the Alai in Kyrgyzstan and joins the Pyandj which is coming from the Pamir at the Afghan-Chinese border. Afterwards the river continues its way under the name Amu Darya. At Termez, the border city between Afghanistan and Uzbekistan, the river leaves the high mountains of Pamir, enters the desert plain of Karakum and then flows down to Turkmenistan. Upon returning to Uzbekistan the Amu Darya finally ends in the Delta downstream of Nukus in the Autonomous Republic of Karakalpakistan.

The Amu Darya Basin is a typical endorheic basin under arid conditions. The climate is continental with cold winters and hot summers. Precipitation rates vary from 100 mm per year in the desert plains to 2000 mm in the high mountain areas. Most of the water of the Amu Darya derives from the high mountain glaciers of the Pamir-Alai-System, while the desert plains that cover about two thirds of the basin do not contribute significant amounts of water. In the opposite, the evaporation rate is very high in the plains and the river loses most of its water through evaporation, infiltration and withdrawal for irrigation. High water levels occur twice a year, the first in April/May after the snowmelt, which is quite short; the second is in June/July after the glacial melt. The largest water share of the river originates in Tadjikistan (72.8 %), 14.6 % of Amu Darya water comes from Afghanistan and Iran and about 8.5 % of the water is formed in Uzbekistan[2]. The largest tributaries are Kafirnigan, Surkhandarya and Sherabad from the east and Kunduz and Koksha from the west. Natural water shortage occurs in March, but due to the overexploitation of water resources in the river basin water shortages may occur also in spring and summer periods. The Amu Darya has an average water flow of 70-80 cubic kilometres per year.

The Amu Darya is the river with the second highest sediment load in world after the Huang He in China. Thus the river bed in the plains is not very stable. The steadily shifting river created the unique Tugai-forest landscapes which unfortunately almost disappeared due to human overexploitation of the forests in the last century. In the Amu Darya Basin the most territories with favourable natural and economic conditions for irrigated farming are located far from the river.

1.1.2 Economy, demographics, politics

Riparian states to the Amu Darya are Tajikistan, Afghanistan, Kyrgyzstan, Turkmenistan, Uzbekistan and to a very little share Iran. While Tajikistan, Kyrgyzstan and Afghanistan are mountainous countries, Turkmenistan and Uzbekistan are dominated by desert plains. All countries are landlocked with a low population density and a share of rural population well above 50 %. All these countries highly depend on agriculture in their economies even though especially Uzbekistan is also rich in fossil fuels and other mineral resources. The main crops in the desert plains are cotton, wheat and in the alluvial areas rice. All these plants are highly dependent on irrigation. Cotton is the most important export good and cash crop in this region.

Tajikistan, Kyrgyzstan, Turkmenistan and Uzbekistan are all transition countries of the former Soviet Union, which collapsed in 1991. Thus the political systems are still lacking the stability of sound democracies that have longer traditions. Afghanistan is even more

[1] The Zerafshan was in former times a tributary to the Amu Darya, but today the river silts up before reaching the Amu Darya.

[2] Central Asian Water Information: download at http://www.cawater-info.net/amudarya/geo_e.htm.

characterised by political instability due to the long history of wars that took place in the country.

Figure 1: Map of the Amu Darya basin

1.2 Main (transboundary) issues in the Amu Darya/ Aral Sea basin

The following description provides a brief overview of the main issues of transboundary relevance in the Amu Darya and Aral Sea basin. The Aral Sea cannot be excluded from the analysis of transboundary issues in the Amu Darya basin, as the water management policies in the river basin have direct repercussions on the lake, with problems culminating here in many instances.

Water is the most important natural resource in Central Asia. The region is highly dependent on agriculture and most of the cultivations need irrigation. The semi-arid to arid conditions of the region create a high potential for water scarcity. Thus sustainable water management is a major challenge in the socio-economic development in the Amu Darya Basin. Three basic issues for (transboundary) water management can be identified:

- Water allocation schemes in the basin, with high potential for conflict among the newly independent, riparian states,
- Gradual drying-up of the Aral Sea, with huge adverse socio-economic and environmental effects throughout the entire region,
- Environmental degradation, with the increase in land and water salinisation.

These three issues will be briefly described in the following section.

1.2.1 Interstate water allocation

With the breakdown of the Soviet System and the independence of the Central Asian national states, the allocation of water shares of the two major rivers Amu Darya and Syr Darya became an important challenge to water management in the region. While the allocation of water shares in the centrally-managed Soviet Union was a merely technical problem, this issue now constitutes a potential source of conflict of critical dimension among sovereign nationalities in arid areas. In the Soviet period, infrastructure was built to serve the needs of the entire Aral Sea basin. In many cases, infrastructure located in one state was

planned for the benefits of other states. Large dams and reservoirs are located in the mountainous but poorer upstream states, while stored water mainly benefits the larger and richer downstream states. The operational responsibility and provision of maintenance for transboundary water infrastructure are now in dispute [12].

In the Amu Darya basin, the upstream countries only use a little share of the surface water economically, but the downstream countries Uzbekistan and Turkmenistan use over 80 % for their production needs, mostly for irrigation of cotton monoculture. Still, water constitutes a major energy source for upstream countries and the expansion of the generation of hydropower is conflicting with irrigation needs. The conflict also has a strong seasonal component, since upstream countries (in case of the Amu Darya: Tajikistan) mostly use the water for hydroelectricity generation in wintertime, making water available to downstream users at a time when it is not needed for agriculture. In summertime, when the water would be needed for irrigation, upstream countries close the dams to collect water for winter. The interlinkages between water and energy management are only insufficiently taken care of. In the wake of the collapse of the Soviet Union existing procedures to achieve integration of these sectors have been discontinued.[3]

In terms of water allocation four major interstate conflict spots can be identified [23]:

- between Tajikistan, Uzbekistan and Turkmenistan at the Vakhsh river because of the Rogun Water Reservoir,
- between Turkmenistan and Uzbekistan because of the Karakum-Channel,
- between Turkmenistan and Uzbekistan at the lower Amu Darya because of the Tujamujun Water Reservoir,
- between Turkmenistan and Uzbekistan because of the construction of the water reservoir “The Golden Age”.

The quotas allocated to Afghanistan and the Aral Sea are equally subject to a constant debate. With the Kunduz, Afghanistan is controlling one of the tributaries to the Amu Darya and thus can basically use as much water as possible. Technical constraints have prevented that all the Kunduz water is abstracted by Afghanistan.

When comparing the Amu Darya with the Syr Darya one can identify two major differences:

- in the Syr Darya basin all riparian states are members of international water sharing agreements, while in the Amu Darya basin Afghanistan and Iran are not party to these agreements, although they parts of the basin lie in their territory,
- the Amu Darya cannot be regulated by upstream countries to the same extent as the Syr Darya by Kyrgyzstan, which renders the relationship between upstream and downstream countries less problematic in the Amu Darya basin,
- unlike in the Syr Darya basin, where Uzbekistan, Kazakhstan and Kyrgyzstan have entered into an international agreement on water and energy sharing, such an agreement does not exist in the Amu Darya basin [12].

The report will mostly focus on the institutional set-up, exchange of information and interplay of actors evolving around the allocation of water among the four countries addressed above. It should be noted however, that this is only the most obvious transboundary issue in this region. Other challenges, referred to in the following sections are

[3] The situation is even aggravated by new parties emerging in Central Asian water politics with Russia and China gaining access to the energy sector. Both countries are looking to develop hydroenergy facilities in upstream countries to export cheap energy.

more related to environmental quality aspect, many of which occur in the Aral Sea, but also throughout the Amu Darya basin.

1.2.2 Aral Sea crisis

One of the most pressing issues in the Amu Darya basin is the desiccation of the Aral Sea. The Aral Sea crisis is one of the most severe natural disasters in the world that only can be resolved by intensive transboundary co-operation of the riparian states. The causes for this crisis are based in a multitude of single issues that are strongly interlinked with each other. The consequences for human welfare in this region are touching many different sectors. New approaches to sustainable water management are the overall basis for addressing the problems that arose from the Aral Sea crisis. This section is about the reasons that led to the Aral Sea crisis and the subsequent difficulties that appeared on the transboundary scale.

Historical experience in the Aral Sea basin indicates that irrigated agriculture can lead to overexploitation of water resources and thus to environmental problems. The current catastrophe at the Aral Sea is more severe and devastating than others that occurred before. The development of the modern irrigation system in the Amu Darya Basin was started under the regime of the former Soviet Union. The first decade for the extension of irrigated agriculture goes back to the 1930s. Cotton became an important commodity for the Soviets and the centralist economic planning determined the agricultural policy for Central Asia to be a cotton producer in the first place. The establishment of irrigation infrastructure in the 1930s was still limited to irrigate the fields adjacent to the Amu Darya. But the improvement of engineering technologies in the 1950s allowed for the implementation of plans for the irrigation of the fertile soils far from the river. The most ambitious project was the construction of the Karakum Channel conveying water to the regions of the Kopet-Dag with a very low precipitation rate. Today the Karakum Channel transsects Turkmenistan from the east to the west providing water for millions of hectares of irrigated land that reach to the Caspian Sea at the Iran border [18].

But also other regions were cultivated through irrigation like the Kashkardarinskaya Steppe around Karshi in the South of Uzbekistan, the areas between Samarkand and Bukhara as well as the region of Khorezm in the North and the Delta of the Amu Darya North of Nukus in Karakalpakistan [18].

Today, water withdrawal for irrigation purposes amounts to 90 % of the water flow of the Amu Darya. This development resulted in a decrease of the water discharge to the Aral Sea and finally to its desiccation. While in the 1960s the Aral Sea still received an average inflow of about 60 cubic metres per year, the inflow fell to 5-10 cubic metres per year with recorded variations of 0-20 cubic metres per year nowadays. As a consequence of the loss of water inflow combined with evaporation, the total area of the Aral Sea decreased from 67,000 square kilometres in 1960 to 30,000 square kilometres in 1996. The sea level dropped by 17-19 meters and the sea shrunk by 70 % to three quarters in volume. In 1990, the Aral Sea split into a small northern sea and a large southern sea. The salinity of the northern part is gradually decreasing as inflows from the Syr Darya dilute the water. But the southern sea was almost biologically dead with salinity levels at around 40g/l in 1997. Fertilizer, biocides and other chemicals accumulate in the water of the sea in addition to salinisation due to evaporation and are worsening its chemical status [37].

At present the ecological situation at the Aral Sea is designated by the following factors:

- a biologically dead water body,
- more than 33,000 square kilometres of exposed seabed that consists of vast salt plains largely made up of agricultural chemicals.[37]

This situation leads to the blow-out of salty dusts with residues from fertilizers and biocides over hundreds of kilometres far from the sea. The deposits of the dust are inducing the degradation of soils in distant regions and together with other factors are responsible for aggravation of desertification. Another significant impact for the entire region is the loss of the climatic balancing function of the lake. The high evaporation rate produced a buffer of cooling humidity in the hot summers and the water's capacity to store heat alleviated the harsh winters. The growing continental climate with extreme heats and colds additionally increases the threat of desertification in the region [37]. Both effects are not limited to a local situation but are of transboundary significance.

1.2.3 Environmental degradation

Apart from the severe problems at the Aral Sea, the large scale irrigated agriculture in Central Asia causes problems in the region as well that need to be addressed. These problems are mainly related to inefficient and wasteful water management schemes characterized by the following circumstances:

- outdated irrigation infrastructure and their insufficient maintenance are causing enormous losses of water due to evaporation and infiltration,
- lack of sufficient drainage leads to the rise of water tables and thus salinisation,
- nitrates from fertilizers, mineral salts from irrigation schemes and toxic chemicals from biocides are contaminating surface and ground waters [20].

These problems have secondary negative impacts on many different sectors of which the most serious are:

- growing threat of water scarcity for large areas in the river basin,
- substantial economic damage through significant declines in crop yields, which has severe effects on food security in the region,
- desertification in vast areas in the river basin,
- deterioration of living conditions due to a loss of employment opportunities in agriculture, higher mortality rates, diseases and health disorders in the wake of environmental deterioration.

These secondary effects have immediate significance at the national level and for the national economies. Still, all riparian states in the Amu Darya basin face similar challenges. From a political perspective, the main transboundary issues described above lead to a continued instability of the still young independent states in Central Asia. Therefore a joint strategy to combat the underlying causes is indicated for mitigating the problems [20].

2 Description of the water management regime

2.1 Water management approach

2.1.1 Past approaches

Water management under the Soviet Union was purely oriented at considerations of the national planned economy. Environmental concerns were usually not taken into account or only in the event of extreme events, such as serious water shortages.

Waters were managed centrally after 1923, with water resources being considered as national property. The main objective of water management in the USSR for the Central Asian region was to provide irrigation for as much land as possible, as soil resources and climatic conditions are favourable of agricultural production, while water availability is not. Large-scale irrigation infrastructure was installed throughout the region, specifically to support and enable vast cotton monoculture systems.

Water was a resource made available almost free of charge. Due to this, efforts for effective water use under the irrigation schemes had a very low priority. As a consequence, severe economic losses affected the countries of Central Asia due to out-dated infrastructure and environmental degradation (see 1.2). Local water users hardly felt responsible for water resources, also because of contradicting and complex structures in the water administration [23].

2.1.2 Current

While politically, the region has gone through far-reaching changes, in terms of the approach to water management, the situation has not changed significantly. Cotton monoculture is still prevailing and the situation is even aggravated by the pressure of the transition to market economies forcing the newly independent states to give priority to short-term solutions in order to assure the annual crop production for meeting export demands but also to ensure food security for their growing populations. There are currently efforts undertaken to increase the efficiency of water use for irrigation, the success of which still needs to come to fruition [33].

2.2 Current water policy with view to transboundary regimes

2.2.1 Regional level

Water policy in the Central Asian region is currently determined by a number of factors, which include

- grappling with the problematic legacy of the former Soviet Union, in terms of institutional structures but also environmental damages,
- their own transition process to new political regime types and the limited institutional capacities to deal with pressing water management issues,
- declining quality of life for the citizens as outlined above.

In such a transient political state and considering the actual and looming environmental crises, interstate conflicts on an important resource such as water had been anticipated [39].

Still, the prevailing pattern of interaction is that of regional co-operation and the development and improvement of regional relationships. This is even more surprising

considering the asymmetrical allocation of water use rights in the Syr Darya and the Amu Darya basin, the general uncertainty in terms of social, political and economic development and the initially unilateral relations with international organisations, which might have lead to independent decision-making and a decline of regional co-operation.

On the contrary, particularly the involvement of international organisations is considered crucial for inducing the current collaborative framework of interaction in Central Asia. Especially on the trans-national level, donor organisations have been very active in enforcing negotiations and thus helping to create co-operation agreements on the transboundary level. These organisations have assumed the role of a 'third party' by providing financial resources and other assistance in form of institutional advice, direly needed by the young transition states, in order to strengthen their internal domestic capacity which is essential for interstate co-operation.

The UNECE Convention on the Protection and Use of Transboundary Water courses and International Lakes and the Strategic Partnership on Water for Sustainable Development is considered as an overarching framework for institutionalising international collaboration in this but also other regions. The Convention was signed in 1992 in Helsinki, developed under the auspices of the UNECE and is essentially made up of two parts. Part I contains provisions relating to all Parties of the Convention, whereas Part II sets out provisions relating to Parties riparian to a given transboundary water course. Uzbekistan, Tajikistan, Kyrgyzstan and Turkmenistan have not yet signed the Convention. This is however, strongly recommended by international donors to facilitate the further development of the current management regimes. Equally, the 1997 UN Convention on the Law of the Non Navigational Uses of International Water Courses, is currently being discussed as a possible framework for transboundary co-operation in Central Asia. This Convention is focussing more on water allocation, but is in other aspects less demanding than the UNECE Convention, for example with regards to concluding river basin agreements. Also for this agreement, the ratification by the Central Asian States is still pending [31].

This still hesitant commitment to international frameworks for the management of transboundary river basin might be an indication for the long process that still lies ahead of the Central Asian states. While certainly cooperative structures have been emerging and a rapprochement of the states has taken place pre-empting any non-civil conflicts, still the implementation of these approaches is lacking in rigor. Another very important factor is the somewhat unclear role of Afghanistan in these discussions. Afghanistan, as an upstream country has largely been ignored by Soviet water management. Only very few outdated arrangements existed. At the current state, the attention still mostly focuses on the four ex-Soviet states. A successful integration of Afghanistan is however very crucial for achieving sustainable solutions to water management challenges in that region. Here again international donors are the first to raise this issue and pave the way for capacity building in Afghanistan [42].

Due to their important role in transboundary water issues, the policies and approaches of international organisations involved in water management in Central Asia will be addressed more specifically in the following sections. The current national approaches in four of the riparian states in the basin are also briefly outlined, since the behaviour of states on the international level is mostly grounded in of domestic policies.

2.2.2 National level

In order to provide a brief overview of the national water management strategies in the relevant countries a brief overview will be provided in the following section. As a general note it should be pointed out that the water management approach in all Central Asian states was transformed significantly after the collapse of the Soviet Union and that the development of new structures has been different in each of the countries depending on the

specific political and social pressures as well as the specific economic condition in each of the Central Asian states. In this section, the situation in Afghanistan is not explicitly considered, as only very little information is available on water management in this country. It can be assumed however that water management so far had little to no relevance in this country compared to more pressing issues as for example the provision of immediate humanitarian aid.

2.2.2.1 Upstream countries

Tajik water management is overseen by the Ministry of Water Management as the main authority and governed by the National Water Code of 2000, which gives priority to economic mechanisms for regulating water uses, specifically licenses and charges for water supply. One of the main issue impacting the economic development of Tajikistan is the shortage of arable land and consequently an unstable food security and most policies are directed at addressing this problem. Tajikistan's main agricultural production areas lie in the irrigated valley of the Syr Darya and the Amu Darya and the Tajik government intends to increase irrigated land by 350,000 ha by 2010. With the new Water Code, it is now possible to transfer irrigation schemes to the private sector. No legislation exists however, as to the granting of water rights, in particular with view to the operation of irrigation schemes.

Tajikistan has largely abolished state control in agricultural matters and eliminated price controls. Water user associations have been established to control intra-farm irrigation systems. In Soviet times, the development of irrigated land had been limited in Tajikistan in favour of downstream areas of the Basin, resulting in a water allocation, which is not meeting the needs of the country.

While this situation is finding its repercussions at the international level, it clearly needs to be considered in conjunction with the further expansion of hydropower infrastructure and the prevention pollution in transboundary waters [33]. Thus, Tajikistan is strongly lobbying for the better integration of the water and energy sectors at the regional level [19].

Kyrgyzstan still finds it agricultural development constrained by Soviet time water allocation schemes, particularly for the Syr Darya and to a lesser extent also for the Amu Darya. At the same time it also strive to expand the share of irrigated land and is thus in dire need for additional water resources. As for the generation of hydropower, this is hampered to a large degree by the compulsory water transfers to downstream countries, although Kyrgyzstan receives energy resources in exchange for its water. As these still have to transformed to energy, the situation results in a shortage in energy supply as well.

Kyrgyzstan maintains a variety of governmental institutions to manage water resources and is very engaged at the international level as well, arguing for a fairer allocation of water in the region. The Kyrgyz president has released a decree in 1997 on 'Foreign policy of the Kyrgyz Republic in the sphere of water resources generated in Kyrgyzstan and flowing into neighbouring countries' mandating the solution of interstate water problems, water allocation and the use of economic instruments for promoting water conservation and efficient use of water and energy resources.

2.2.2.2 Downstream countries

In Turkmenistan the water sector is still largely state controlled and dominated by a single administrative body, which is overseeing all areas of water management ranging from municipal water supply and sanitation, irrigation as well as hydropower generation. Irrigated land amount to 1.86 million ha and is expected to reach 2.2 million ha by 2010. Major water resources are drawn from the Amu Darya. Irrigation is provided at no charge up to a certain limit. A major issues in Turkmenistan is agricultural run-off causing downstream pollution with major impacts on drinking water quality.

In order to meet the problem of degrading water quality in the wake of environmental pollution, Turkmenistan has proposed the development of an international agreement on the quality of transboundary waters for the Amu Darya basin [33].

Water management and its interrelation with agriculture and energy are key policy areas in **Uzbekistan**, the country being heavily dependent on irrigation agriculture on the one hand and on transboundary water sources for a large part on the other. Several national action programmes have been devised in the past years mapping out strategies for the key areas of water management (drinking water quality, water supply and groundwater protection). In restructuring its water sector, Uzbekistan follows a differentiated approach for the various water uses. There is however, a generally strong tendency towards privatisation also in the irrigation sector, while massive subsidies are still maintained at the current stage.

Uzbekistan is ridden by a number of concerns in relation to transboundary water resources and thus very active in pursuing the furthering of regional co-operation with its neighbouring countries. The country further advocates the compliance with international agreements among the riparian countries and closely monitors the effectiveness of the Interstate Coordination Water Commission of Central Asia (ICWC). On a more technical level, Uzbekistan has a strong interest in the operating control of primarily three transboundary reservoirs: Toktogul, Kayrakum and Nurek. Uzbek government officials furthermore strongly lobby for the improvement of the information systems for water management and their extension to include water quality issues as well [19].

2.3 Water law and the Institutional Framework

2.3.1 Soviet era

The regulations valid in the Amu Darya basin during Soviet times still have repercussions on the management of water resources in the region today. Therefore, a brief overview of the agreements and the institutional framework of the time before 1991 will be provided before turning to the development thereafter and the current state.

In particular two decisions in Soviet water management should be highlighted with regard to transboundary water management. In the wake of several water crises in the mid-Seventies and the early-Eighties in Central Asia, there was an increasing awareness about the need of concerted action across the region. The former USSR Ministry of Land Reclamation and Water Management (USSR Minvodkhoz) arranged for the establishment of river basin organisations, the BVOs[4], to manage the resources in accordance with regulations and schedules agreed by the Ministry. The BVOs for the Syr Darya and the Amu Darya were installed in 1986 and still exist until today while having been integrated into new organisational structures [33].

The allocation of water among the four Central Asian republics was based on the water development master plan for the basin drafted by the central authorities in Moscow. The four Central Asian states approved the master plan by way of Resolution 566 of the Science and Technological Council of USSR Minvodkhoz in 1987. The agreed allocation foresees a share of 0.6 % for Kyrgyzstan, 15.4 % for Tajikistan, 35.8 % for Turkmenistan and 48.2 % for Uzbekistan. Afghanistan was not an official signatory to the resolution, while previous agreements had failed to clearly specify the share of the Amu Darya's water available to Afghanistan. Since the allocation specified through the Resolution hold valid until new have been specified Afghanistan's share of water as well as its integration into the system remain uncertain [38]. An additional quota principle was entered for the sharing of water between

[4] Basseynoe Vodnoe Obedinenie.

Turkmenistan and Uzbekistan, which foresees an equal share of the adjusted run-off at Kerki hydrological post, which is valid until the present day.

2.3.2 Post-Soviet era

At the international level, the Amu Darya basin is very much determined by the agreements reached by the riparian states after the collapse of the Soviet Union in 1991. Efforts of the Central Asian Republics to reach a common approach concerning transboundary water resources culminated in the 1992 'Agreement on co-operation in the management, utilisation and protection of interstate water resources'[5] (1992 Agreement), with Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan as signatories [37].

With this agreement, the five Central Asian states 'committed themselves to refrain from any activities within their respective territories which, entailing a deviation from the agreed water shares or bringing about water pollution, are likely to affect the interests of, and cause damage to the co-basin states (Article 3)'. Article 1 defines the water resources of the region as common and integral. According to article 4 of the agreement, the Central Asian states agree to jointly undertake activities for the solution to the problems related to the drying up of the Aral Sea and to determine yearly sanitary water withdrawals based on the availability of water resources.

The agreement lead to the establishment of the so-called Interstate Water Management Coordinating Commission (IWMCC – later referred to as the interstate Commission for Water Coordination or ICWC)[6], which is composed of the five ministers of water management of the riparian states and has the mandate to control and ensure rational utilization and protection of the interstate water resources. Until recent changes, the ICWC not only oversaw utilization but also aimed to provide incentives for adhering to regional water allocation regimes[37]. Together with the so-called regional Basin Water Management Organisations, BVO[7] Amu Darya and Syr Darya as the operative branches, the ICWC also held responsibility for the short and long-term water development and allocation planning, water quality control, conservation and environmental protection[8].

A number of other intergovernmental organisations were created between 1993 and 1995. This rather rapid emergence of new international organisations for the management of shared water resources can be explained by an interest in ensuring regional co-operation in the transitional period after the collapse of the Soviet Union [39]. Organisations installed in this period include:

- the Interstate Council on the Aral Sea basin (ICAS), based in Tashkent, Uzbekistan was designed to set policies, oversee intersectoral co-ordination and review projects conducted in the Aral Sea basin with the Executive Committee of the ICAS, charged with the implementation of the Aral Sea programmes, the Russian Federation enjoyed observership status with ICAS and provided technical and financial support. The ICAS as a co-ordinating platform consisted of 25 representatives from the five Central Asian states (five from each state), the ICWC was subordinated to the ICAS.

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5 Signed in Almaty, Kazakhstan.

6 Article 8 specifies the role of the ICWC: responsible for the development of water management policy in the region, taking into account needs of all branches of industry and econom, rational use of water resources and perspective programme of watr supply for the regions and measures for its realization.

7 Basseynoe Vodnoe Obedinenie.

8 Stipulated in Article 9 of the 1992 Agreement.

- the International Fund for the Aral Sea (IFAS), based in Almaty, Kazakhstan responsible for the management and co-ordination of funds provided by the member states (supposed to amount to 1 % of the state budget), donors and international organisations,
- the Sustainable Development Commission (SDC), formerly Interstate Commission for Socioeconomic Development and Scientific and Ecological Cooperation (ISCDSTEC), based in Ashgabat, Turkmenistan providing for the inclusion of economic, social and environmental factors in planning processes of the ICAS at the transboundary level. UNDP was one of the main drivers in the process leading to the formation of this international commission as well as the National Sustainable Development Commissions in all five states.

The further development of this organisational structure was in the following years heavily influenced by the drafting of further international agreements with the general objective of developing cooperation and improving the protection and management of water resources in the Aral Sea basin. Agreements signed in this period included:

- 1994 saw the emergence of the **Aral Sea Basin Programme** (ASPB), which was construed in collaboration with donor organisations (World Bank, UNEP and UNDP) and countries, the five central Asian states and contains practical projects to be implemented at the regional level in the following areas:
  - stabilization of the Aral Sea at a sustainable level,
  - socio-economic development of the affected areas,
  - strategy and management of the water resources of the Amu Darya and the Syr Darya,
  - installation and strengthening of institutions for planning and implementing these measures.

Regional organisations were responsible for the implementation of the programme. The programme was initially designed for 15 – 20 years, in May 1997 the World Bank declared the first phase as completed although some of the planning processes had not been finalized, due to insufficient fund for some part, but also the lack of experience of World Bank staff in Central Asia [23]. Further funds were issued by the World Bank and the GEF in 1998 in order to focus on technological improvements in the area of drinking water supply and irrigation.

- the 1995 Declaration on the sustainable development of the Aral Sea Basin (**Declaration of Nukus**), securing the financial contributions to the ICAS and the IFAS, this declaration was signed by all Central Asian States, the World Bank and the United Nations. It was expressed clearly that the initially agreed financial contributions were not met by the countries. The Declaration acknowledged the over-exploitation of natural resources as the main cause for the Aral Sea crisis and its ecological and socio-economic consequences. The necessity of concrete measures, regional co-operation and a better information policy is clearly recognised. Concrete allocation targets and binding obligations are not stipulated in the Declaration.
- the 1996 agreement on the organisational structure of international basin organisations, establishing the interlinkages of the various organisations and aiming to streamline their areas of responsibility. IFAS, its Executive Committee, ICWC and its executive bodies, the Scientific Information Centre of ICWC and the Basin Organisations (BVO Syr Darya and Amu Darya) emerged as the main organisations in managing transboundary regimes. ICAS was merged with the former IFAS, the executive functions for the ASBP.

These agreements and organisational structures on the international level are more or less related to the organisational framework and policies at the national level. These and also the bilateral agreements existing in this region will be briefly outlined in the following section. It should be mentioned that information was not available for all riparian states.

Transboundary issues in national water legislation

The **Tajik** Water Code of 2000 establishes several principles for Tajik co-operation in international water relations based on internationally agreed water law principles, such as the Helsinki Convention [19].

At the national level, **Uzbekistan** has formulated a number of important objectives in the National Environmental Action Plan (NEAP) advocating among others the 'integration of international obligations into national programmes and action plans on environmental and water resources management' [31].

In 2001 **Kyrgyzstan** issued the law on 'interstate use of water objects, water resources and water facilities of the Kyrgyz Republic', which basically confirmed the underlying principles of the co-operation of other countries with Kyrgyzstan in the field of water resources.

Turkmenistan is putting markedly less input on the regional co-operation in Central Asia and is focusing much more on its relations with the Caucasus, the Middle East, Iran and Caspian egress routes. As a consequence, Turkmenistan mostly acts as an observer to Central Asian co-operation agreements and refuses to take part in regional water management schemes [19].

Bilateral agreements

Several bilateral agreements supplement the multi-party agreement signed by all Central Asian republics. The most relevant is probably the 1996 bilateral agreement between Turkmenistan and Uzbekistan. This agreement reiterates the initial sharing agreement of 1987 for the water of the Amu Darya below the river gauge at Kerki. These two countries furthermore maintain an agreement at the technical level on operating the transboundary drainage collectors, which originate in the Khorezm region in Uzbekistan and terminate in Turkmenistan.

2.4 Actors in transboundary water management in the Amu Darya

2.4.1 Joint bodies in river basin management

As described above, the key organisations in transboundary water management emerged in the course of a process over the past 15 years. The following sections aim to represent the current status.

Description

The current set-up of the IFAS reflects the merger of the initial IFAS with the ICAS. IFAS consists of the Executive Committee with two representatives of each riparian country, responsible for the implementation of the decisions adopted by the IFAS Board, consisting of the Deputy Prime Ministers of the five states. The work of the IFAS is related to the management and co-ordination of the funding of projects and programmes in the Aral Sea basin. This activity involves liasing with the national branches of the IFAS as well as international organisations and donors, the implementation of projects and the accumulation and allocation of funds. In this function, the ICWC also supports the activities of the IFAS.

The ICWC fulfils a number of functions, the key responsibility of which is the development and co-ordination of annual consumption quotas for the riparian countries and the management of these allocations based on water availability. The ICWC furthermore

operates and maintains the water abstraction facilities controlled by the BVOs. On a more strategic level, ICWC oversees the development of the regional water management policy taking into account public as well as economic concerns in order to increase water availability in the region. In this function ICWC also advises regional governments on pricing policies for water abstraction and the legal base for water use, is in charge of large infrastructure construction and the introduction of water conservation technologies. ICWC is the key institution in the area of environmental monitoring and co-ordinates research in development in the water management field. ICWC furthermore comprises the BVOs for the Amu Darya and the Syr Darya, the ICWC Scientific Information Centre (SIC) and the ICWC Secretariat as executive bodies.

The BVO Amu Darya, based in Urgench, Uzbekistan is mainly responsible for overseeing the allocation of water, according to the agreed quotas to users in the basin. It also controls the discharges to the Aral Sea and the operations of inter-State reservoir. Other tasks include the measurement of water levels, river flow assessment, the operation of canals, head gates and control facilities at inter-State structures and also the design and engineering service of new water management equipment [33].

Interplay and powers

While the structure of the institutions has been somewhat clarified through the more recent agreements, the practical activities of these international structures are not used to their fullest potential. In general these institutions have very limited capacity and function according to some contradictory principles. The water sectors operates largely independent and without co-ordination with the energy sector. Another issue is related to the geographic location of these institutions: most of them are based in Uzbekistan and managed by Uzbeks without following a rotation principle. Particularly, the effectiveness of the IFAS has been very much hampered by this situation and kept it from successfully developing regional water management strategies or negotiating regional water and energy sharing agreements [19]. Recently, IFAS in an effort to broaden its scope relocated its offices to Dushanbe, Tajikistan and initiated a series of activities to reactivate the work of this organisation.

For the ICWC, it has been reported that in particular its recommendations on agreed water allocations and water releases to the Aral Sea are not always complied with by the riparian states thus limiting the effect of the organisation’s efforts on the ground.

The leverage of the BVOs in mitigating these shortcomings is also limited, as many of the major water abstraction facilities and hydropower plants are controlled by national authorities and not the inter-State basin organisations. The sections of the Amu Darya within a country’s national borders are under the jurisdiction of the national authorities limiting the BVOs in the fulfilment of their tasks. Furthermore the BVOs have only limited capacities to monitor the amount of groundwater abstraction, flow discharges or water quality. In performing this task they are not collaborating with national hydro-meteorological services, which often leads to contradicting data bases and misleading information [33]. This is mostly related to the limited technical capacities of the BVOs to transmit and process data effectively.

While there is a general agreement of all states involved to increase the leverage and efficiency of this international institutional structure through strengthening their financial, legal and organisational capacities. However, there are differing views in terms of the design of the organisational form of the long-term co-operation [33].

2.4.2 International Donor Organisations

International donor organisations constitute a main actor in transboundary water management in Central Asia. Most visible here are the World Bank, UNDP and UNEP, the US Agency for International Development (USAID), several national development agencies

(e.g. Switzerland and Canada) as well as the EU-TACIS[9] programme. The Asian Development Bank is also currently increasing the involvement in the region.

After the independence of the Central Asian states, international donor assumed a very important role in shaping the international water management process in the region, engaging not only in financing and enabling concrete projects, but also facilitating the consolidation of institutions for transboundary water management and the design of international agreements on shared water resources.[10] The international organisations were instrumental in keeping the momentum in the efforts to foster to cooperation among the riparian states and reducing mistrust and tensions among the key players. The fact that meetings, conferences and joint agreements are now being initiated by the states themselves is considered as a success of the involvement of these organisations. Furthermore the intervention of the international donors lead to the broadening of the 'negotiation set' to link in energy issues, thus ensuring that upstream countries would not divert the water courses for their own uses.

Weinthal [39] furthermore argues that through their strong involvement international organisations have 'constructed states that are necessary to conclude and later implement interstate agreements'.

2.4.2.1 World Bank/UNDP/UNEP and the Global Environment Facility

UNEP entered a contract with the former Soviet regime in 1990 to investigate the situation in the basin and prepare a first diagnostic study on the most pressing problems to serve as a basis for further activities. While the diagnostic study did not result in the aspired results, it still marks the starting point for the long involvement of this UN agency in the region.

The World Bank is one of the most important international organisations that are actively involved in development aid in Central Asia. The World Bank's mission to Central Asia started quite soon after independence of the Central Asian states in 1992.

In order to investigate the needs of development aid in the Aral Sea Basin the World Bank sent a first mission to Central Asia in 1992. After the first period of investigations the World Bank formulated programmes and strategies for the Central Asian countries. The approach towards development was always connected to the Aral Sea basin in general and water management in particular. The Bank tended to address the entire basin, including the Amu Darya as well as the Syr Darya basins. Against this background, the World Bank has chosen a two-fold approach – support for regional co-operation and assistance to national country operations.

World Bank Strategies that tackle transboundary issues are [15]:

- strategic planning and comprehensive management of the water resources of the Amu Darya (and Syr Darya),
- building institutions for planning and implementing sustainable water management.

Together with other international donors the World Bank and the Central Asian Countries launched a programme for the Aral Sea. The main funds for this "Aral Sea Basin Programme" are provided by the Global Environmental Facility (GEF), a financial mechanism for projects and programmes for the protection of the global environment.

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[9] Technical Assistance to the Commonwealth of Independent States (TACIS).

[10] TACIS funded a program to support the drafting of water sharing agreements through the organization of training activities, the establishment of working groups and the provision of advice on international water law.

Implementing agencies to GEF are World Bank, UNDP and UNEP. In the special case of the "Aral Sea Basin Programme" the World Bank acted as implementing agency.

The full project of the GEF "Aral Sea Basin Programme" started in 1998. An important focus of the project was to strengthen transboundary water management institutions, such as EC-IFAS, ICWC and SDC.[41] However in the Implementation Completion Report of the project [42] it was highlighted that projects on the regional level with different governments involved had little prospects for success. Especially the development of a detailed operational strategy that was considered to be fruitless due to the divergent opinions of the countries involved. The recommendations of the World Bank are now shifting towards a strategy for project implementation at national level.

Even if the implementation of the project failed in terms of resolving interstate disputes, it shows that a good basis for co-operation is the overall requirement for successful transboundary co-operation.

International donor organizations have played and still play a major role in the policy formulation process in the water sector of Central Asia. At the same time they are often accused of a lack of co-ordination resulting in a duplication of efforts, reduced effectiveness of programs, inefficient use of funds and a lack of recognition of the achieved results.

While there are hardly any official statements available on the underlying reasons for the obvious mismatch of the international organisations' activities, these might be rooted in fundamentally different approaches to the problem as well as diverging motivations for the involvement in the process.

While UNEP and UNDP are usually considered to place environmental and social concerns and improvements in the region on top of their agendas, the World Bank is often viewed more sceptically. Highly influential, equipped with considerable financial means, the World Bank probably saw the project as an opportunity to link environmental and conflict issues with political and economic reform in the aftermath of the Rio Earth summit and the collapse of the Soviet Union, thus clearly catering to economic interest of the West. From the perspective of the individual institutions, besides the World Bank this would also include USAIS, EU-TACIS and others, the involvement in Central Asia, helped to improve its reputation abroad, confirmed their status as political actors and helped secure revenue streams.

In the wake of several failures in the past international donors are currently in a process of adapting their strategies, considering new approaches and activities as well as adjusting previous initiatives [19]. Whether this will finally lead to the attainment of the goals formulated over and over again remains to be seen. Experts view this process rather sceptically. They argue that through the heavy involvement of international donors, the young states in transition were rendered in a position to cover the social cost of the transformation and demonstrate their willingness to establish a democratic regime, while at the same time legitimizing old elite structures, resisting the changes and reforms necessary to sustainably address the challenges of water management in the region [39].

This would mean that the process would be fundamentally stalled by the continuation of old power structures supported by the financial contribution of the international community. An indicator for the validity of the statement is the limitation of international agreements to very general goals without the inclusion of any concrete steps to ensure their implementation.

2.4.3 Involvement of stakeholders and the public in transboundary river basin management

At the current stage, non-governmental actors or even the public do not actively participate in water policy in Central Asia. The reaction of water management officials towards the

involvement of public stakeholders is usually rather sceptical. This might be due to the inherent fear that NGOs might effectuate a complete overhaul of water management regimes resulting in the loss of power and influences. Mc Kinney [19] even describes the relationship between officials and user groups as very antagonistic.

Overcoming this gap in knowledge and trust will require significant efforts over the next years. Initial steps in this process would be the identification and analysis of the key stakeholders in this process. In many cases these are still at an emerging stage. Water user associations are forming in some of the Central Asian states, other groups would be fisheries and navigation organisations, industrial and municipal water users and of course environmental groups addressing various aspects of river basin management.

At the international level, there are already explicit provisions for better addressing different groups of water users. Still, these are currently not being implemented. Since the first step in addressing stakeholders is the provision of information, discrepancies, shortcomings and inefficiencies in the production and dissemination of information will have to be overcome in the first instance. The first attempts in assuring this are reflected in the mandate of the ICWC to engage in raising awareness for water management issues and emerging risks [33].

It should be noted in this respect however, that with glasnost, favourable conditions were created for grassroots and opposition movements to form in the Former Soviet Union and awareness-raising in the West for the environmental destruction taking place in the region. Western NGOs sought to establish contacts and collaborative agreements with nascent Soviet NGOs. At that time one could observe an emergence of international campaigns mostly focusing on the Aral Sea and preserving the cultures of the peoples living near the Sea. These attempts have been quite successful in establishing sustainable activism in certain parts of the region with a definite focus on the Aral Sea, mainly due to the obvious degradation of the water resources there. At the same time international donors as well as Western NGOs have been strongly lobbying for the strengthening of local NGOs. The World Bank responding to increased environmental activism increasingly involved NGOs in many of its projects, leading to an involvement of NGOs in 48 % of all World Bank projects in 1996 [39]. Furthermore particularly Western NGOs are in a position that allows them to bypass governments and politician, follow an agenda different from large donor organisation and approach problems more locally. In contrast to international donor organisations, aiming to influence high-level negotiations, NGOs often operate in a somewhat unconventional way when it comes to negotiating, thus helping disadvantaged social groups to gain access to negotiations and at best have a role in the decision-making process as well. Through their local operations they definitely contribute to the evolution of a civil society in those countries.

Thus, several NGOs, Western as well as local, are active in the Central Asian countries. However, the extent to which they are actually involved in decision-making in water resources management is rather limited and still needs to evolve. Western as well as local NGOs are by far not allowed to work completely unhindered. Strong registration requirements apply in many of the Central Asian states and often their activities are clearly limited to the environmental and educational sector [39].

2.4.4 Links between the scientific community and policy makers

In Soviet Union times, science was duly esteemed. University education had a high quality standard and the scientific network and the information exchange between scientists was well established. This situation changed with the independence of the Central Asian states. While science and good education still have a high relevance, universities and scientific institutes are often lacking sufficient funds. Networking and information exchange among scientists became much more difficult simply because travel costs could not be covered any more. Nevertheless the domestic networks in the individual states are still existent. The

networks have a more “private” nature and are based on personal contacts that often go back to university times. Thus the nature of exchange is in most cases very informal and not institutionalised.

The relations between policy makers and scientists are not easy to define. In the Soviet Union, science was often the core underlying principle for decision-making. Science and technology constituted the basis for the Soviet belief in progress. In that time, science was important, but it had often the solely function to justify the Soviet regime’s policy. Research that was critical of the regime’s policy was usually oppressed. Following independence, new circumstances gave direction to the development of the scientific communities in Central Asia. On one hand the democratisation process of the countries created new opportunities for scientists to engage in more independent research. On the other hand, funding for research activities became even more limited due to the critical economic situation of the newly independent states.

The relation between scientists and policy- makers is still dominated by mutual distrust. New mechanisms for co-operation between policy and science have to be identified in order to create a climate, where scientific research can provide information to policy-makers that allow a critical examination of the issues in question. Policy-makers have to learn that a sound scientific research does not necessarily endanger their political power. The science community have to learn to be more independent from the influence of the political leaders.

The co-operation between scientific and political institutions is still very limited. Some linkages between science and policy are given by personal contacts between administration officers with university degree and researchers of scientific institutes, but it is doubtful that these contacts have any significance for decision-making processes.

At the transboundary level the situation is at least more promising. New scientific institutions have been established in water management like the Scientific Information Centre of ICWC. This policy level is highly influenced by international organisations calling for more transparency (see 2.4.2). The agreements on transboundary water management furthermore support independent research in order to base international negotiations on a sound scientific basis.

2.4.5 Influence of political cultures / values

The deficits in the relationships and interactions described above can partly be explained by the complexity of the process and by multitude of the interlinked levels of actors and institutions. Another important factor is the cultural disposition of the actors involved. In many cases this culminates in a clash of Western and Central Asian cultures but also of the value sets of the basin states themselves [39].

Obviously, the legacy of Soviet institutional structures is still strong throughout the region, while different transformation processes have taken place in the individual states during the past 15 years after independence. Old elites in many cases only installed democratic institutions to appease the international donor community, while at the same time securing their own position and catering to their own economic interests, which lead to a consolidation of the authoritarian or semi-authoritarian rule in the region. The inability of international donors and NGOs to introduce democracy in those countries is related to the failure of initiatives for promoting accessible water resources management practices taking into account all relevant factors and not only those promoted by established elites [1]. This was particularly problematic, when considering that most assistance for addressing water problems is needed at the local level. However, the above mentioned inertia at the national level in many cases prevented international initiatives from trickling down to the local or farm level, where the actual management decisions are taken.

Another impediment in the relationship between the individual countries and international organisations and NGOs is the deeply entrenched role of corruption in Central Asian states, rendering the allocation of funds and the collaboration with local actors extremely difficult for international parties. Corruption is also expressed by an observed discrepancy between formal and informal institutions and regulation. This might be a reason for the lacking success of international water sharing and management agreements on the ground [1].

As regards the negotiations and collaboration among the Central Asian states it is important to consider, that after gaining sovereignty from the Soviet rule, the states eagerly tried to distinguish themselves from each other by taking independent decision and devising their own water management strategies, thus creating unfavourable conditions for international co-operation efforts. This was in many instances reinforced by the new emphasis on ethnic identities as a mean of differentiation from the other states [1].

Furthermore, the predominance of the cotton and water culture in some of the states (Uzbekistan, Turkmenistan), following the initial designation of the Soviet planned economy for the responsibility for specific economic input, is still very valid until the present day. This notion is for example reflected in the dominance of Uzbekistan in the applied sciences on water use and irrigation. As this status is reinforced by the other states as well as international organisations active in the region, moral monopolies are created, which make it difficult to set an equal playing field for international negotiations [39].

These are only a few components of the complex of political cultures and value systems in the region. In order to successfully overcome inherent impediments to change processes these need to be brought to the awareness of the various actors at the national as well as international level.

2.4.6 Interlinkages of water management with other policy areas

As noted above, water management in Central Asia has been and still is inextricably linked to agricultural interests and specifically to the continuation of cotton monoculture. In Soviet time, water was provided at almost no charge in order to cater to the needs of cotton farming. The specific actor constellation in cotton farming led to the emergence of certain power structures, which partly remained functional until the present day. Faced with the new political situation, political leaders only displayed a limited willingness to give-up short term economic benefits reaped from cotton revenue to address long-term and persisting water challenges and mitigate the severe environmental damages that have occurred in the past decades. This can be explained by the inertia of the former Soviet induced patronage networks that emerged in cotton production and still remain in existence.[39] This is a phenomenon that can be found through out the entire Central Asian region, where irrigated agriculture provided the foundation of the basin's economy. The fast emergence of the first international agreements is explained by this strong interdependence of water and agricultural issues. Even the involvement of international donors has not lead to the loosening of this strong tie, especially since the dependency of the region's economy still heavily depends on irrigate agriculture.

The interlinkages between the water and energy sectors become most obvious in the water for energy trading arrangements set-up between the upstream and downstream countries in the basin. These arrangements entail their own set of negotiations, which are however more focused on the Syr Darya river basin than the Amu Darya. Coupling water and energy issues is considered instrumental to prevent conflicts over water use. Still, the actors network are currently emerging and need to be consolidated in future.

2.5 Factors for institutional change

Although the Central Asian region went through a fundamental political change with the demise of the Soviet Union, changes in the water management regime have only occurred very slowly and rather reactive to the new boundary conditions[43]. Water management during Soviet times was highly centralistic with most decisions taken in Moscow in the context of the national planned economy. While the newly independent states sought to set up their own water management systems in order to secure their access to and the availability of this important resource, transboundary issues in water management, including water allocation, but also water quality emerged. Many changes in water management approaches were introduced following the pressure and the facilitation of international (donor) organisations and NGOs.

The most visible institutional change is the probably newly established structure of international joint bodies set up to manage transboundary water resources. After the initiation phase, the structure has been adapted several times in order to assure more transparency and efficiency of these institutions. Some success has been achieved in this respect. At the same time, very dominant and conservative structures in the Central States, looking to maintain the old dominance of irrigated agriculture, countervail the developments at the international evel. This might also explain, why – although faced with one of the most severe environmental catastrophes in the Aral Sea basin – the willingness of the states to take action is still very hesitant. The necessary shift in water management paradigms, away from a technocratic, centralistic command and control approach towards more resource-oriented participatory strategy has not yet been finalized.

3 Description information management

3.1 Specification of information goals, needs & strategy

The availability of information necessary to manage water resources in the Amu Darya basin on the transboundary level is far from satisfactory. In order to fulfil their tasks outlined above, the interstate bodies for transboundary co-operation would need sound information on:

- water availability,
- water losses through evaporation,
- leakage factors etc.,
- the development of water quality,
- economic data on agricultural production,
- energy generation,
- best available techniques for irrigation as well as hydropower generation [33].

Without this information, effective negotiations leading to realistic agreements are hardly achievable. A major shortcoming throughout the Central Asian region is that for the most part, this kind of information is considered sensitive under the light of national secrecy. Furthermore efficient monitoring systems have not yet been established, which would ensure the constant production of the required information.

The DPSIR-framework, developed by the European Environment Agency, creates a basis for the analysis of the information requirements for managing transboundary water issues. The framework differentiates among information needed to assess driving forces, pressures, state, impacts and responses, while also acknowledging the strong causal links among these elements. This section briefly discusses how the DPSIR-framework applies to information management in the Amu Darya basin.

In the Amu Darya basin, all components of the DPSIR-framework need improvement. Main **driving forces** in the basin are food and water security, availability of energy resources and the stability of climate conditions, which are addressed by transboundary water management. In order to depict these driving forces, data about population, energy use and production, types of industry, agriculture and land use would be needed. Prevailing **pressures** in the basin resulting from human activities are the (over)exploitation of water resources, water pollution and changing climatic conditions. Relevant data in this context entail the use of resources, in this case mainly water resources, emission to environmental media and the production of waste. The **state** of the environment encompasses water quality and quantity, climate and health conditions of humans. **Impacts** are defined as severe economic losses in agriculture, deterioration of human welfare and interstate disputes on water allocation shares. **Responses** would be efforts for the mitigation of these problems, as for example the Aral Sea Basin Programme, international agreements, technical solutions etc.

For the Amu Darya basin, at the level of international river basin institutions, it can be stated that none of the information requirements described above is fully met. This observation holds true for data collection as well as for information distribution. The BVOs for example are not accepted by all riparian states in the Amu Darya basin. National policies and measures prevail over the BVO’s activities and in many cases the BVO does not have control over the water regulating infrastructures of the individual states[38]. Also international organisations are often excluded from information. Even large donor

organisations like World Bank and UNDP claim that they do not have access to information they need to perform their mission.

3.2 Information production

The Scientific Information Centre (SIC) is one of the executive bodies of the ICWC and was set up as an institution for the collection and analysis of information relevant to decision-making in the context of transboundary collaboration in the basin. The SIC is responsible for data processing and information distribution. In fulfilling its tasks the SIC collaborates with scientific institutions in the contracting countries as well as on the international level with organisations like the World Water Council, the Network of Basin Organizations and the Global Water Partnership.

In 1995, a Water Resources Management Information System (WARMIS) was created in collaboration with the BVOs and foreign specialists, sponsored by EU-TACIS. The system consists of three regional and five national nodes within the common network, allowing for the permanent exchange of information related to water use in an agreed format [25]. The SIC also engages in the development of river basin model and future scenarios, such as the ‘Globesight’ methodology, which are intended to be used as tools for devising water strategies and priority setting in international river basin management.

The systems draw on data collected by the national hydrometeorological services of Central Asia. For some major rivers, hydrometric observations were carried out already at the turn of the 19th century. In the 1980s the monitoring system was in its best shape, while the system deteriorated considerably in the 1990s due to the economic instability. Many observations posts were closed down as they could no longer be maintained or modernized. Monitoring technology is old-fashioned in many cases, measurements are imprecise and carried out irregularly yielding haphazard sets of data, which can hardly be considered be described as representative [39]. Data for agriculture and water ministries is transmitted through paper documents, which leads to delay and distortion of data. Projects funded by international donors are currently underway to improve the monitoring system and data transmission. Other efforts are currently concentrating on improving and stabilising the observation of snow and glaciers in mountains for hydrological forecasting.

3.3 Communication

The SIC ICWC is providing information to all ICWC members through the following communication channels:

- Quarterly meetings of ICWC,
- Conferences and seminars,
- Databases on the internet,
- Publications (also translations of international publications into regional languages),

Much information of the SIC ICWC is available on the internet in Russian and English, The internet seems to be the ideal medium to communicate in a vast area like the Central Asian region. But it has to be taken into account that internet access is, although coverage is increasing, not yet available in every government administration office, which means that not every actor concerned with water management in the region can obtain access to the information via the web.

Even more importantly, large user groups, such as land-users, agriculture and industries are not provided with specific information relevant to local issues. As noted before, there is no

official information policy with regard to other relevant stakeholders or the general public from the side of the international bodies in transboundary water management.

A further important issue is the exchange of information between the hydrometeorological agencies of the countries in the region, which has not been realized until today. A common information service would be much needed however in order to carry out observations of water bodies at the transboundary level.

3.4 Utilisation of information

The data collected at the international level is used in order to monitor the allocation of water shares according to the agreement among the riparian states. Forecast data on run-off data is furthermore instrumental in managing the water systems sustainably by predicting the water availability during the growing season. Incorrect forecasts can cause serious damage especially if they do not take into consideration unexpected events, are not accurate and are delivered too late.

The inaccuracy of data has in the past let to disparities in the distribution of water, for example in the year 2000. A comparison of forecast and actual values for the main reservoirs shoes a multitude of errors for the growing season, resulting in a shortage of water of 30 % for that year [33].

The latent conflict over the allocation of resources is even aggravated by the discrepancies between the reported and the actual usage of the individual states. There are indications that Uzbekistan might be using more water than allocated, while claiming the same about Tajikistan and Turkmenistan. Other sources suggest that these objections might be unjustified. The situation however, is far from clear due to insufficient and even conflicting data sources on the allocations and actual flow conditions. In addition, data on the actual conditions in the basin are conflicting. According to official national data the riparian states receive water according to the protocol. Other data collected by the BVO suggest otherwise. Data collection procedures as well as the usage of data in decision-making processes are not transparent [38].

4 Evaluation 'Adaptiveness'

This evaluation exercise is predominantly targeted at eliciting the adaptiveness of the transboundary water management system. This is however closely related to the set-up of the national governance systems in the water sector. Where available, this information has also been considered for the analysis.

4.1 Formal actors and informal networks

While the co-operation of sectoral governments, particularly those from the water, agricultural an energy sectors, would be crucial for the integration of the different policies at the international level, there are still obvious deficits as regards such collaboration. The agricultural sector is still very dominant and decisions in the water and energy sector are in many cases taken independently from each other. Many decisions in the past have been taken in order to ensure the viability of irrigated infrastructure. This observation holds true for the national as well as the international level. It needs to be acknowledged, however, that only after the initiation of negotiations about shared transboundary resources, the energy sector has been added to the discussion in order to mitigate potential upstream – downstream disputes.

Such issues are discussed on the international level, where joint bodies for managing shared resources were set up soon after the collapse of the Soviet Union. In that sense, upstream and downstream countries do participate in decision-making. However, the upstream countries, which in this constellation are the less powerful, still have a considerably weaker leverage than the powerful downstream countries (Uzbekistan, Turkmenistan).

The Interstate Commission for Water Co-ordination (ICWC) was set-up to oversee and monitor the allocation of the available water resources in the basin and the monitoring thereof. This authority is however not fully accepted by the individual riparian states. Downstream countries regularly exceed their original allocation. Also, below the surface of the international commission there are currently a number of latent bilateral conflicts, which remain unresolved. These are mostly nurtured by the fear of the downstream countries that upstream countries will gain more control over the resource in the wake of the construction of new hydropower dams (as in the case of the Rogun dam). But also the allocation of water between Turkmenistan and Uzbekistan in connection with the Karakum Channel is the reason for a constant quarrel between these two countries. Conflicts are usually not dealt with constructively with disagreements being dragged out over years. In many cases, this is related to the differing interpretation of data, contradicting scenarios of future water uses and also a general mistrust between the riparian states. On the other hand, in some cases countries are interested in pursuing regional solutions, such as in the case of the further development of hydropower generation in Tajikistan. There is a strong desire to develop new agreements to meet international resource needs. However, there is reluctance of downstream countries to engage in these discussions. The lack of co-ordination among the national water laws in one reason. On the other hand it is currently not understood that national sovereignty can be maintained while reaping benefits from an increased synchronisation at the same time.

In terms of the vertical integration of the different levels of government, the former centralistic structures of the Soviet Union are still very present in all of the Central Asian states. While there is some decision-making taking place on the regional level, the majority of the decisions is taken on the national level.

The participation of non-governmental stakeholders in water management is very limited at the current stage. Particularly at the national level, gaining access to decision-making and

planning processes is extremely difficult for user groups as well as NGOs. While various organizations have emerged after the political change in 1992, they are in many cases marginalized with old networks of government official remaining strong and influential.

Special mentioning needs to be made in this context about the role of international donor organizations and international NGOs in shaping the negotiations about water resources at the international level over the past years. This involvement however needs to be clearly differentiated from participatory structures at the national levels, as powerful international donor devise of completely different ways of influencing national governments.

4.2 Legal framework

A framework for the management of transboundary water resources is set-up by the international structures of joint bodies. The framework is however far from being complete as many issues remain unresolved, which results in continued bilateral conflicts. While the institutional structure has been adjusted several times over the past years, substantial changes to the agreement, such as the adjustment of the water allocation quotas will be very difficult. Furthermore, the enforcement of the agreements lack in rigor due to insufficient monitoring and information.

4.3 Policy development and implementation

The water sector in the Central Asian region is heavily influenced by management decisions taken in Soviet times, which have created many lock-in situations. The severest of these decisions is probably the concentration of regional agriculture on irrigated cotton monoculture. Most water management decisions are guided by the needs of this specific sector well until the present day. While the collapse of the Soviet structures would have offered the opportunity to strive for a more diversified agricultural structures thus relieving the stress on the water resources, this avenue was not followed in the Central Asian states but rather the old systems reinforced. In that sense, water management in the region is very much oriented at the short term needs of the agricultural sector while not taking into account the long-term effects on the environment as well as the welfare of the population. This will continue to decline if the current management regime is continued.

Apart from the agricultural sector, water management, especially in the field of hydropower, is very much guided by the further development of large-scale infrastructure. Projects of regional dimensions and beyond are no longer under consideration. Still, the construction of massive infrastructure for the generation of hydropower and also for the diversion of water is still a very viable option, which would only offer a very limited potential for re-adjustments to changing boundary conditions.

In terms of the implementation of policies, there also quite a few shortcomings on the international level. While the framework for collaboration is quite encompassing and at least all former Soviet republics have subscribed to it, the implementation of the policies for sharing international water resources is lagging behind. In some cases national governments on have submitted to these agreements formally without the actual intention of implementing them. Rather than adopting new approaches and applying them in national context former water management paradigms are dogmatically stuck to.

4.4 Information management

The management of information on transboundary water resources is very difficult in the region due to lacking transparency and inefficient data collection and monitoring, which aggravates the conflicts already existing or at least does not help to alleviate them.

Institutions for collecting and disseminating information have been set-up at the international level. These have to work under difficult conditions. The data exchange among the different national monitoring and observations systems is not very effective. In many instances data is withheld for confidentiality reasons, although it would be instrumental for decision-making. Some states have a stronger influence on the collection and processing of data than others. For example, the powerful downstream countries with a strong focus on agriculture have also dominated research on water management over the past decades.

There is a strong tendency towards the manipulation of data. Incidences, where data gathered on the national level differed from that collected at the international level have occurred regularly. Uncertainties in forecast are seldom taken into consideration although measurement intervals are long which increases the likelihood of inaccuracies.

Information on water management is not disseminated to the public. Even international donors have problems in getting access to the data.

4.5 Financial

The development of water management in the Central Asian region is heavily dependent on the intervention of international donors. Although market-based mechanisms for the use of water resources are currently being introduced in most of the countries (Turkmenistan constitutes an exception here), users charges are by no means enough to cover operation and maintenance of water management structures, not to mention the initial investment. Environmental and resource cost are not taken into account. Due to the strong reliance on outside funding, the payments provided by international donors play a very important role not only for the water management sector but also for the entire country. As some scholars have put it ‘professional givers have created professional takers’. While quite some success has been undoubtedly achieved through the involvement of donors, at the same time their early involvement has also lead to a certain inertia among those in power, preventing more thorough reforms form happening.

On the side of the donor a clear need for further co-ordination of the individual efforts to increase the efficiency and avoid duplication has been identified.

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