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Cross-bordering Water Management in Central Asia

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Cross-bordering Water Management in Central Asia

Conflict Constellations and Ways to a Sustainable Resource Use

Bernd Kuzmits

1 Introduction

Whenever discussing the topic of 'cross-bordering water management in Central Asia', the Aral Lake disaster is mentioned as a revealing example of the devastating effects of interventions in bio-geographical regions. The desiccation of the formerly fourth biggest freshwater reservoir in the world is regarded as one of the biggest man-made ecological catastrophes. But the developments at the water courses of the upstream (black) Irtysch, the upstream Ili to the Balchasch lake as well as the Sary Dschas and the upstream Aksu to some extent depict, albeit under different conditions, similar structural management problems which remain in the shadow of the worldwide attention to the Aral lake.

The governance aspect of the efforts to realise a resource-friendly development only gained worldwide significance after the Rio declaration of 1992. It increased with the insight that the solutions for the current und future water crises do not lie in new and exceptional technical achievements or supply-side measures but in an improved water resource management (Allan / Wouters 2004). This fact applies to Central Asia in particular. Measured with the average water quantity of the stream courses and the usable groundwater sources, water should currently not be a scarcity resource in Central Asia (yet). The main stream which mostly spring in the high mountains of Pamir and Tienshan could also supply sufficient water in dry years for the population. Yet there are a number of factors putting water 'under stress' as an available resource. Among these factors are the climatic conditions and a high population growth in the region as well as the reliance on irrigation-intensive agricultural products (cotton and rice), a substance-draining infrastructure and a lacking sustainability culture as examples for management induced factors. The Aral Lake basin faced the additional challenge after the collapse of the Soviet Union that the irrigation system which had been centrally controlled by Moscow and tailored to the development plans of Moscow was internationalized with all its defects. Ever since the water policy in Central Asia has been characterized by partly conflictive national development interests not considering mandatory balancing or cooperation mechanisms. Other Central Asian watercourses outside the Aral lake basin already crossed international borders before the collapse of the Soviet Union (between the People's Republic of China and the Soviet Union before 1991, between Kyrgyzstan and Kazakhstan since 1991).[1]

This paper summarizes the conflict constellations, structural deficits and political context factors of transboundary water management in Central Asia. The presentation of the existing water economy in its historical and geographical context is followed by an analysis of the corpus of legislation and institutions of transboundary water management and depicts its problems. Finally, a number of approaches are discussed which could facilitate a more efficient and cooperative transnational dealing with the water resources in Central Asia.

2 Geographical and historical background

First, the significant Central Asian water basins with a transboundary character will be epitomized (see fig. 1) before outlining the historical background of water use in the region.

2.1 Geographical data

The Aral Lake basin encompasses the entire territory of today's Tajikistan, Turkmenistan and Uzbekistan as well as the south of the Kyrgyz and the Kazakh Republic. Some areas of the basin are located in the north of Afghanistan (approximately 8 per cent), a very small part in China and Iran as well. The territory

[1] Due to its origin in and its line of the border to Afghanistan (see below) the Amudarja, the southern vein of the Aral Lake basin, was also a transbordering water course. For the water management this has not been relevant so far, though.

of the basin can be divided into two dominating morphological zones: The Turan lowlands in the central and western part with the deserts Karakum (in the south/south-west) and Kyzylkum (in the north) as well as the high mountains in the east with peaks of over 7000 meters.

The climate in the entire region is very continental with predominantly arid and semi-arid areas. The average rainfall of the region is 270 mm, with a range of 600-800 mm in the mountains and 80-150 mm in the desert regions.

The two most significant rivers of the Aral Lake basin are the Amudarja in the south and the Syrdarja in the north. With an average runoff volume of 79.3 km³ per year the Amudarja is the biggest river of Central Asia. It is about 2.540 km long[2] and has a drainage area of 309.000 km². From its source, a Pamir glacier in the Afghan Vakjdjir pass near the border to Pakistan up to the point where it meets the Wachsch coming from Tajikistan it bears the name Pjandsch. Besides the Kundus from Afghanistan the rivers Kafirnigan (from Tajikistan), Scherabad and Surchandarja (from Uzbekistan) reach the Amudarja.[3] Thereafter, though, it continuously loses water on its way through the Karakum desert to the Aral Lake - by infiltration, evaporation and particularly due to irrigation agriculture.

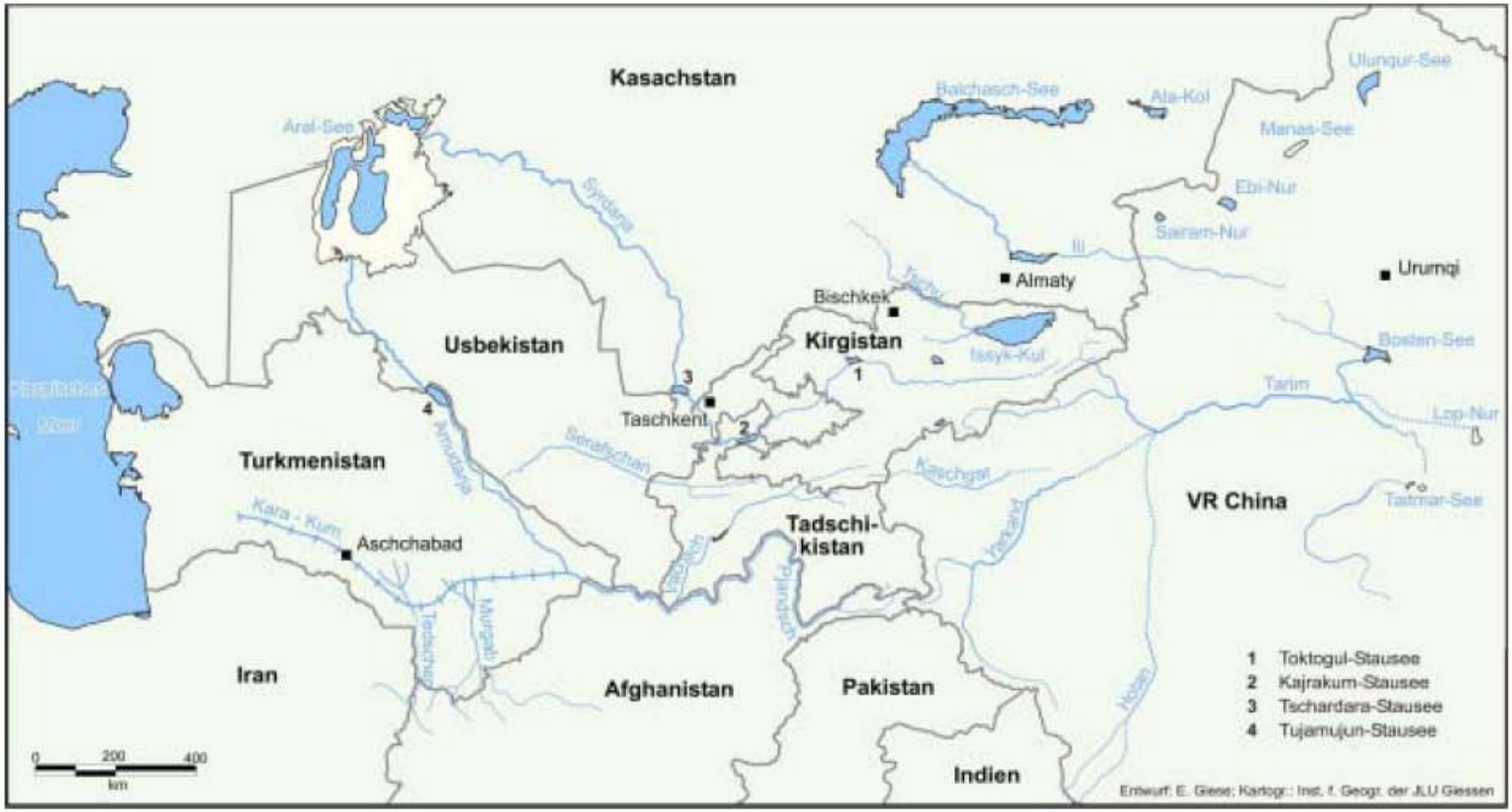
At the upper reaches most of the river marks the northern border of Afghanistan (first to Tajikistan, then to Uzbekistan and Turkmenistan). At the underflow the Amudarja first flows through Turkmenistan, before running out through the Uzbek Khorezm and Karakalpakstan to the Aral Lake after a short border section with the Tujamujun dam lake. With a length of 3.019 km (including the Naryn) the Syrdarja is the longest and with an average water volume of 37,2 km³ per year the second biggest river of Central Asia. Its drainage area encompasses 219.000 km². It has its origin in the river Naryn, which springs from the glaciers and snowmelts in the Tienshan mountains of the Kyrgyz-Chinese border area. Similar to the Amudarja the Syrdarja also acquires its name after the meeting of the rivers Karadarja and Naryn in Kyrgyzstan. Since the Syrdarja is no longer reached by a number of former tributaries (Chu, Talas, Assa and Bugun), it does not receive any more significant water inflow when flowing through the Uzbek Fergana valley, through Tajikistan, Uzbekistan again and finally through the Kazakh steppe to the (smaller) Aral Lake in the north-west.[4]

[2] Data on the length of the rivers varies according to whether the particular source rivers are taken into account or not. The length quoted here adds on the source river Pjandsch.

[3] The Amudarja is not reached by its former tributaries Tedjen, Zerafshan and Kashkadarja (Dukhovny / Sokolov 2003).

[4] By now the Aral Lake is divided into a smaller northern lake (Small Aral) and a larger southern lake (Big Aral). The northern lake is fed by the Syrdarja. Its water level is seems to stabilize due to little evaporation, whereas the southern lake is shrinking further due to the insufficient inflow of the Amudarja (Breckle / Wucherer 2005).

Abb. 1: Übersichtskarte Zentralasien (West- und Ost-Turkestan)



Source: Giese et al. 2004: 5

Taken together, both rivers have an annual runoff of about 116 km³ (Micklin 2002: 508). In addition, there are renewable ground water resources with a total volume of 43,49 km³ (25,09 km³ in the Amudarja region, 18,4 km³ in the Syrdarja region). As mentioned before and documented by table 1, the majority of the renewable water resources of the Aral lake basin spring in the mountains of Central Asia and thus predominantly in the states Kyrgyzstan, Tajikistan and Afghanistan.

Table 1: Natural runoff in the Aral lake basin (Perennial average in km³ per year)

State	River basin		Aral Lake basin	
	Syrdarja	*Amudarja*	*km³*	*in %*
Kazakhstan	2,426	-	2,426	2,1
Kyrgyzstan	26,850	1,604	28,454	24,4
Tajikistan	1,005	55,73	56,735	48,6
Turkmenistan	-	1,53	1,530	1,3
Uzbekistan	6,167	5,056	11,223	9,6
Afghanistan	-	14,500	14,500	12,4
Iran	-	0,86	0,860	0,9
China	0,755	-		0,7
Basin total	37,203	79,280	116,483	100

Source: Dukhovny / Sokolov 2003: 3.

With a water surface of 18.000 km² the Balchasch lake by now is bigger than the Aral Lake, which has shrinked to 25 per cent of its original surface of 69.500 km². Yet the shallow Balchasch lake has a relatively small volume. In case of an evaporation of 1000 mm or 14 km³ per year and the non-appearance of any other tributary the lake could run dry very quickly (Giese et al. 2004: 23). The main tributary of the Balchasch lake is the Ili, which provides 79 per cent of the water supply flowing into the western part of the lake.[5] The Ili springs in the Chinese province Xinjiang. About three quarters of its water volume of 22,87 km³ per year are produced in Chinese territory.

The Irtysch, the fifth-longest river in the world, springs in the Altaj mountains on Chinese territory and flows more than 600 km through the People's Republic of China as the ‚Black Irtysch'. After crossing the Zaisan lake in Kazakhstan it flows as Irtysch through the industrial heartland of Kazakhstan to Russiam where it meets the Ob and finally flows into the Arctic Sea. According to Chinese data, the Chinese drainage area of the Irtysch (approx. 57.000 km³) produces a water runoff of 9,26 km³ per year. Adding the runoff coming from Mongolia and Kazakhstan and substracting the officially stated runoff for the irrigation agriculture in the Chinese Xinjiang (1,7 km³/ per year), the Irtysch carries 9,4 km³ per year through Kazakhstan (Giese et al. 2004: 36). In order to supply Karaganda, the second biggest city in the Kazakh SSR, the Soviet Union built the second biggest canal in Eurasia from the Irtysch (Sievers 2002: 378)[6].

2.2 Historical Background

Irrigation agriculture in Central Asia by no means is a Russian or even Soviet achievement. Its history goes as far back as the Bronze Age (one millennium B.C.).[7] It has always relied on the natural resource of the big rivers, especially the Amudarja and the Syrdarja, whose current changed frequently due to

[5] The Balchasch Lake is divided by the Saryesik sound in a larger Western part and a more saline eastern part. Basically, the western part is a flow path basin for the Eastern part, which receives only about 21 per cent of the tributaries from the Dschugarian Alatau through Karatal, Aksu and Lepsy.

[6] According to Sievers it even is the biggest canal, though it is likely that the Karakum in Turkmenistan was not taken into account.

[7] For the traditional water management in Central Asia see O'Hara (2003).

exposure to natural as well as human influences (Bregel 2003). In the course of centuries a sophisticated system of water management had developed.

During pre-Soviet time there was a centralized and hierarchially organized control system. The responsibility for the allocation of utilization rights, however, remained with local authorities. To receive utilization rights, farmers had to pay taxes and participate in maintenance work. There were so-called ‚water masters' (Mirab) on all hierarchy levels. This system largely continued to exist during the Russian colonization (Herrfahrdt 2004: 38; Sehring 2004: 309). Cotton had also been cultivated in the region already before the Russian exertion of influence. Uzbek farmers, for example, tilled their fields with an annual rotation principle, changing between cotton, vegetables and Alfalfa as well as pasturing (Rumer 1989: 82). In this vein, winter as well as spring harvests could be reaped. During Soviet time the concentration on cotton and wheat in monoculture superseded this crop rotation (Spoor 1993: 147).

In the course of building up the Soviet Union, Moscow revoked water management from the sphere of competence of the eldest and their council and conferred it on the ministries of agriculture, land and water use as well as energy. As a strategic resource for the massive extension of the agricultural production water became a ‚common good' (O'Hara 2003). By means of central planning and the erection of regional[8] irrigation systems the agricultural output increased enormously in the Soviet part of Central Asia, with a concentration on water intensive field crops. The immense expansion of irrigation areas began with the virgin land policy initiated by Chruschtschow in 1953 and subsequent infrastructural major projects entailing the construction of dams and canals. Cotton became a monoculture, and the arid Central Asia thus advanced as the ‚cotton field of the Soviet Union'. The main task of water resource management was the supply of the cotton industry by means of a networked approach. Accordingly, the headwater countries were scheduled to let off water at the underflow in the summer in time for irrigation of the cotton fields which they would have rather needed in winter for the generation of water power. The abdication of an independent energy production was compensated by energy and food supplies. Due to the drastically increasing consumption of the irrigation agriculture the big rivers fed less and less water to the Aral Lake, in fact less than was necessary for the preservation of its volume. The Aral Lake began to shrink. Originally, 55-56 km³ water per year reached the Aral Lake through the Amudarja and the Syrdarja. This amount guaranteed the existence of the Aral Lake in its form before the development measures and expansion of the irrigation agriculture (Giese et al. 2004: 10). According to inofficial information from 2001 a gaging station located 100 km from the lake measured an average water runoff of merely 3,0 km³ for the Amudarja (Wegerich 2005: 209f.). The disastrous consequences for the sanitary, economic and social circumstances as well as for the biodiversity in the region are manifold (see fig. 3 and chapter 3): „The Soviet Union's white-golden dreams eventually turned brown, as the ill effects of its [...] unsustainable planning began to be manifest." (Peachey 2004: 3)

The comprehension of the deficits and disastrous consequences of the existing water resource management as well as the lacking financial resources evoked the emergence of new accents at the end of the 1980s. First, major projects were freezed which would have merely continued existing structures as another interference with the eco-system and would have led to a geographical expansion of failures including the consequential damage. This holds for plans to melt glaciers or to divert water from the Sibirian rivers Ob and Jenissej to the Aral lake basin.[9] Second, with the river area organisations (BVO)[10] the first regional institutions were established for the monitoring of water economy. After the collapse of the Soviet Union the new states of Central Asia faced the challenge of harmonizing their own development interests with a joint water resource management. New agreements and insitutions emerged rapidly, albeit with a weak bindingness and acceptance (see chapter 5).

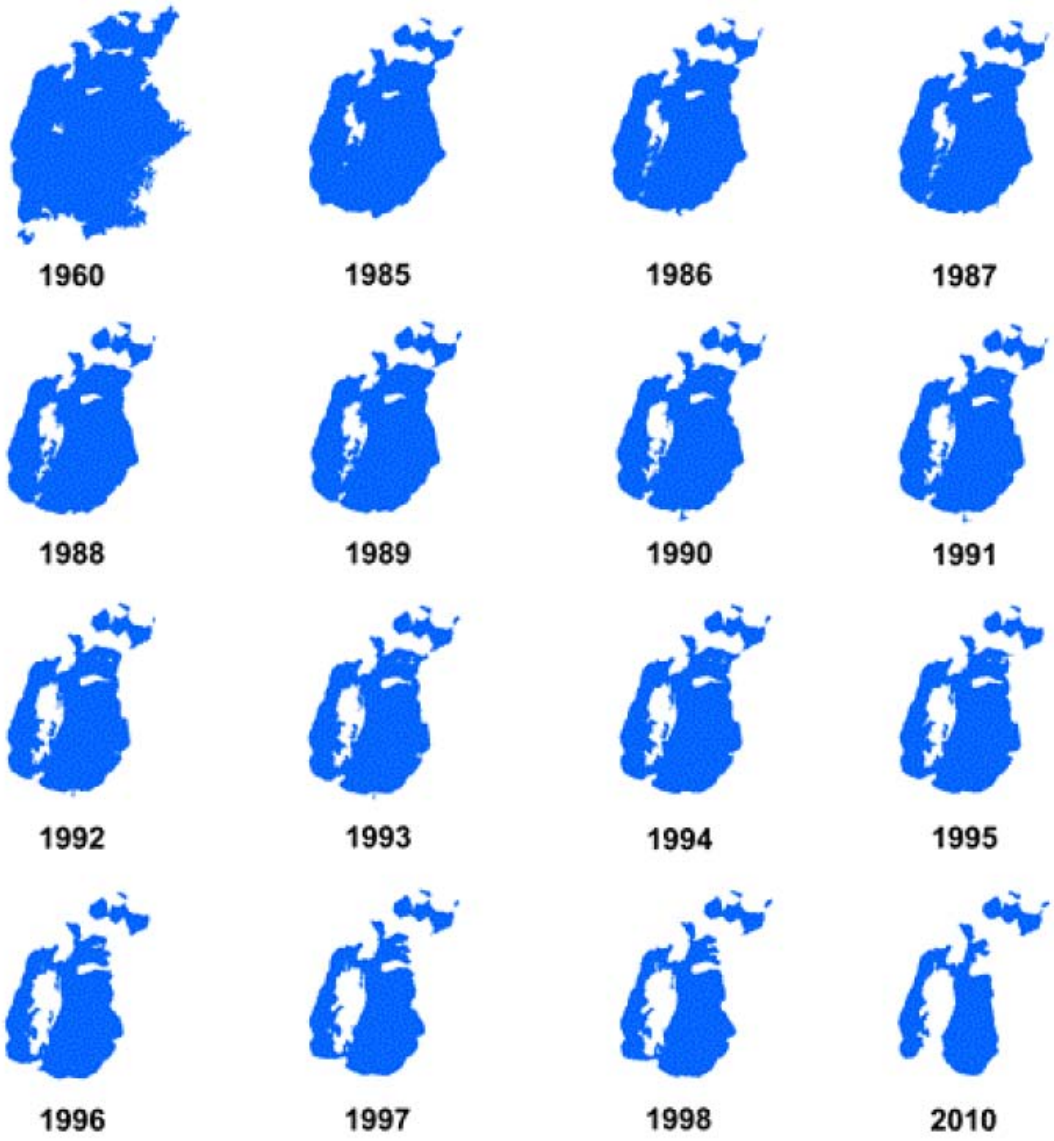
[8] If not defined differently, the term ‚regional' refers to the South of Kazachstan, the states Kirgisia, Tajikistan, Turkmenistan and Uzbekistan as well as northern Afghanistan and the Chinese province Xinjiang.

[9] Even though the scheme of diverting the river would fail even today because of lacking funds – let alone the consequences for the Siberian water supply – it still finds supporters. Lately, among the most prominent were the mayor of Moscow, Luschkow, as well as the presidents of Kazachstan and Uzbekistan, Nasarbajew and Karimow (Giese et al. 2004).

[10] The acronym refers to the Russian name Basejnaja Vodnaja Organizacija.

The historical context of the transboundary water courses with China naturally is quite different. East-Turkestan, today the autonomous region Xinjiang of the People's Republic of China, was the bone of contention for a long time between Russia and China. Between 1945 and 1949 the region was subordinated to Soviet occcupation administration. Around that time there even temporarily existed a state with a Uigurian administration and its own currency. However, out of respect for the relations with China, Stalin divulged the Uigurian independence to China. China annexed Xinjiang and granted the province the status of an independent republic in 1950. Uigures and minorities of other Central Asian ethnicities in most cases fled to Kazakhstan and Kyrgyzstan. As a result of the Chinese settlement policy the Han-Chinese by now make up the majority of the population. After the collapse of the Soviet Union China accelerated the development of the region. Comprehensive resettlement plans, industrialisation and the expansion of the irrigation agriculture are all components of this policy, entailing an increased demand in water. Currently, eleven big water development projects are said to be planned (Giese et al. 2004: 35 ff.). Furthermore, the industry in the region of Karamay is developing rapidly after the tapping of numerous oil deposits. Likewise, substantial water quantities will be needed here as well in the future.

Fig. 2: The shrinking of the Aral lake



Source: German Aerospace Center (DLR), from: Spoor / Krutov (2004): 285.

3 Consequences of the misguided water management in Central Asia

The large-scale development of water resources, mostly for irrigation, has changed the hydrological cycle in the region and caused serious environmental problems in the Aral Sea Basin. The most dramatic effect has been the shrinking of the Aral Sea and disruption of its ecosystem" – such is the assessment of Viktor Dukhovnij and Vadim Sokolov, director of the scientific information center of the Interstate Commission for Water Coordination in Central Asia (ICWC) (Dukhovnij / Sokolov 2003: 4)[11]. The consequences of this development affect the neighboring countries of the Aral Lake in particular, the region Kzyl Orda in Kazakhstan and especially the Uzbek autonomous republic of Karakalpakstan, the more so as the little water reaching the Aral Lake is highly polluted. On annual average, 72 kg of pesticides per hectar were allegedly used in Karakalpakstan alone in the years 1980-1992 (Atanijazova 2003).[12] Due to their extreme occurence the consequences in Karakalpakstan may be presented exemplarily:

- The state of health of a majority of the population is particularly precarious in Karalkalpakstan. Diseases such as respiratory infection, tuberculosis, blood anemia, cancer, adverse effects on liver and kidney as well as allergies are widespread. In 1998, 18 per cent of all pregnancies ended with miscarriages. One in twenty newborns has deformities, the risk being five times as high as in Europe (Atanijazova 2003: 3). The dramatic state of health is aggravated by the breakdown of the medicare since the collapse of the Soviet Union (MSF 2003).

- The decreased water quality and quantity has direct consequences for the biodiversity in the region. The fish stock is decreasing dramatically. The natural means of existence are dwindling. In the coastal region, whose population primarily lived off fishing aside tourism, the catch quantity dropped from 40.000 to 2.000 tons per year.[13] There are no economic alternatives. Due to high unemployment and the deterioration of living conditions the region has witnessed increasingly widespread migration.

- The loss of biodiversity not only manifests itself directly in the decline of the fish stock. As a result of salt and dust particle drifts the coastal region is becoming desolate. Reed areas have decreased from 600.000 to 30.000 hectars (ha), the Tugai forest even from 1,3 mil to 50.000 hectar.[14] Instead, steppe and desert areas are rapidly expanding.[15]

- With the diminution of the water area the Aral Lake loses its regulative effects on the climate in the region. Temperature rise and increasing aridity are mesured in up to 200 km distance from the lake.[16] In fact a general warming is identifiable in the region since the 1970s, which some researchers already regard verified by the findings of increased glacier melting and water runoff (Giese / Moßig 2004: 62). Sand storms occur more often, carrying contaminated soil particles into the region.

Alarming development scenarios are also imaginable for other river and lake basins in Central Asia, as Tursunov has developed for the Balchasch lake. If the diverse dam and canalization plans for the Ili and its tributaries should be realised, the reduction of the tributary from 15,0 to approximately 10,0 km³ per year would entail a diminution of the lake as illustrated in figure 3. UNDP has already issued warnings predicting a development in the Balchasch lake region similar to the Aral Lake, if Kazakhstan and China should fail to agree upon a joint and improved water management (RFE/RL 2004). Even though the

[11] A detailed assessment of the ecologic, economic and social consequences is undertaken by the report of the INTAS project RFBR 1733 (August 2001, s. http://www.cawater-info.net/aral/aral4_e.htm- download: 28. April 2005).

[12] This amount by far exceeded the average use in the Uzbek Soviet republic (54 kg). In comparison, Atanijazova amounts the annual average quantity for Russia (RSFSR) to 4 kg, and for the USA to 1,6 kg (Atanijazova 2003: 2).

[13] see FN 9

[14] The Tugai forests are dense, natural forest formations of the Amudarja delta, consisting of reed, cattail as well as elms, willows, ash and maples trees and cottonwood, which today can only be found in the northern part. The Tugai forests are of crucial importance for the regional water supply, ecology, economy and human health.

[15] see ibid.

[16] INTAS-RFBR, 2001 (see FN 10).

Balchasch lake is currently recovering from its all-time-low (1986), which is commonly ascribed to a transformation-induced decrease in the irrigation agriculture in Kazakhstan, higher precipitation and improved permeability capacities of the Ili deltas, such scenarios should not be ignored (Giese et al. 2004: 28). The Kazakh side is also concerned by Chinese plans to diverge a 300 km long canal from the Irtysch.

Fig. 3: Development scenario: Diminution of the Balchasch lake

Quelle: Tursunov 2002 (p. 294)

4 Problem dimensions and typical conflict constellations of water use

While the previous paragraph highlighted some of the consequences of the water resource management in Central Asia, the following paragraph seeks to systematically analyse the problem dimensions of typical conflict constellations of water use in Central Asia.

The glaciers of the high mountains will continue to provide water for a considerable time. However, water generally is a scarce resource in Central Asia, which is characterized by big, non-runoff and arid basin areas with vast desert complexes, and is becoming even scarcer in the underflow regions. Economic interests particularly in the areas agriculture and energy production put the resource 'under pressure' (Votrin 2003). The infrastructure of the facilities is broken down. Some researchers hold the opinon that the mentality of use still follows the approach ‚use it or lose it' with the well-known consequence: „Although many in the region believe that water is 'God given', the current environmental disaster is man-made" (Spoor / Krutov 2004: 282).

But what should be deduced from this observation: Should the agricultural production switch to other, less irrigation intensive products? Does water need to be used more efficiently to provide sufficient quantities to all? Should there be a rethinking regarding economic means of control such as price fixing? Is the problem one of distribution and hence a genuine management problem on the regional and local level? Or would the modernisation of the infrastructure suffice to solve the current predicament? As may be guessed, the complexity of the problem dimensions and conflict constellations is part of the challenge on the way to a cooperative resource management. But one thing after the other:

Interests: After the end of the Soviet Union a central entity defining the economic structure of the region was superseded by five new states with developing economic interests diverging from the former trade-off system. In the case of the Aral lake basin, the headwater countries Kyrgyzstan and Tajikistan pressed for an independent energy supply by draining water from their dams in winter. The underflow countries Kazakhstan, Uzbekistan and Turkmenistan, however, were unwilling to alter the date and amount of their water demand due to their agricultural focus, but instead strove to raise both the amount and prices of

their energy supplies to the headwater countries (ICG 2005). Moreover, the basis for the barter trade of ‚water for energy and food' crumbled away with the end of Soviet Union and was subsequently characterized by decreasing liability. The development strategies of the Central Asian states were aligned to greatest possible self-supply and thus independence in the food and energy sector. According to a typical headwater-underflow-constellation the underflow regions have no hydraulic control whatsoever. Yet they seek to obtain it by means of political pressure through resource deprivation (energy) or their political-military importance (Uzbekistan). The barter trade approach was only sustained for the Syrdarja with the skeleton agreement of 1998, which nonetheless is unable to prevent repeated crises between Kyrgyzstan on the one side and Kazakhstan and Uzbekistan on the other[17]. For the Amudarja, however, there are no new regulations of the barter trade, even though old arrangements[18] for both rivers on the division of the water use amounts were updated with the Aral lake treaty of 1992. These will continue to be monitored by the BVOs[19]. By updating the quota system, however, the water demand in north Afghanistan is not taken into account, which is expected to rise in future with the extension of the local agriculture. This also applies with view to the industrial and agricultural extension plans for the Chinese Xinjiang, which is not integrated at all into agreements on the Aral Lake basin and only bilaterally integrated into agreements on other watercourses.

Infrastructure: A number of regions in Central Asia bear potential supply and maintenance conflicts: „In all five countries of Central Asia, most irrigation systems are in a state of disrepair. The water control and distribution system is deteriorating, and the aging water supply systems are at risk" (Cai/McKinney/Rosegrant 2001: 33). The irrigation and drainage systems in use today were predominantly built during Soviet time (mainly between 1950 and 1980) and are overage (World Bank 2003: 3). The pipeline systems by 80% per cent consist of ground canals, entailing high losses through seepage and evaporation (Butterfield 2001: 120). Due to lacking maintenance and the high proportion of sludge and sand in the water the canals get clogged with slush particularly at the river underflows (Votrin 2003: 7). Not only since the collapse of the Soviet Union there is a lack of necessary investment for the maintenance and renovation of existing hydrotechnical facilities. But ever since the financial commitment has downright plummeted (Wines 2002). Confronted with manifold socio-economic transformation challenges, there is no money for repairs. Moreover, the burden sharing for the preservation of the facilities is not regulated bindingly. For example, Kyrgyzstan demands a stronger participation in the maintenance costs for the Toktogul dam from the underflow countries Kazakhstan and Uzbekistan.

Meanwhile, the initiation and continuation a number of major projects appears to be planned Turkmenistan is currently constructing a new canal for the ‚Golden Age' dam lake, Russia is investing in the completion of the dam system at the Tajik Amudarja tributary Vachsch which has initially got under way in 1976 (Gleason 2004). Both Kazakhstan and China are planning to use the water resources of the Balchasch basin more intensely for the expansion of irrigation areas, which would necessitate the construction of new canals.

Quality: With increasing salinization of the grounds the demand for water rises to wash out the fields. The salinized and chemically polluted drainage water in turn contaminates the ground water as well as the middle and lower river courses. Excessive irrigation of cohesive soil layers leads to water logging (Jagdish / Vlek 2000: 32). A cycle: the grounds require more water use, continue to deteriorate and with them the water courses. An indicator for this observation is a decrease in the agricultural productivity, which, alongside a transformation induced effect, can also be ascribed to the decreasing ground and

[17] In January 2004, the Syrdarja in Kazakhstan and Uzbekistan flooded large parts of both countries. The reason: For means of energy production, water was let off the Toktogul reservoir in Kyrgyzstan, a dam lake of the Syrdarja tributary Naryn. Due to the hard winter and in particular because of Kazakhstan and Uzbekistan exceeding their energy supplies the Kyrgyz side felt obliged to take this measure. Bilateral agreements between Kazachstan and Kyrgyzstan in January 2004 earmarked the keeping of energy supplies in return for the reduction of the water power production at the Toktogul. One year later the strong outflow from the Toktogul again exceeded the capacity limits of the south Kazakh Chardara reservoir at the Syrdarja (IRIN 2005).

[18] According to protocols from 1984 for the Syrdarja and 1987 for the Amudarja.

[19] China and Kazakhstan have also agreed upon a Entnahme quota for the Irtysch.

water quality. Even though the underflow regions suffer besonders from the salinization and contamination, the Fergana valley has also witnessed a substantial decline of the ground water quality in the past (Cai/McKinney/Rosegrant 2001: 26 ff.).

Water use: Sporadic measures to enhance efficiency in the use of water so far yielded little success. For example, in the context of the remuneration of the resource water, Uzbekistan has included a discount in the ground tax. However, this constitutes a rather unsuitable instrument for water management as it is not comsumption based, does not revert to the market mechanism and thus does not suffciently reflect the scarcity cirumstances (Herrfahrdt 2004: 99). In all of Central Asia there is no area-wide system of water prices. Of all measures taken, merely the switch of cultivated products from cotton to wheat generates positive effects in terms of water consumption. The overall consumed water quantity decreased in the last few years. However, this can be largely attributed to the drought and thus a general lack of water during this time rather than a reversal of the trend aimed at politically or effected by saving measures (Herrfahrdt 2004: 100). In the course of this drought the deficits and the conflicts associated with the water distribution increasingly came to the fore and revealed the need for structural changes. In times of average or above-average availability the necessity of saving is sure enough quickly forgotten, to the detriment of the runoff lakes. First approaches to an improvement of the water management could come along with the foundation of the water use organisations (WUAs). It will primarily depend on the type of implementation and the organisations involved, to which extent the WUAs can contribute to efficiency enhancement in the use of water and the rehabilition of the irrigation systems. It is questionable, to which extent the latest reforms of the water sector can contribute to the reduction of consumption. Local experts estimate that the orientation towards hydrologic borders will not change the shares for the provinces (Wegerich 2004b).

It is occasionally pointed out in the literature that there is a general lack of conscience on all levels that the necessity to save water is not merely justified by the resulting consumption options, but that it creates the basis for the preservation of the Aral lake and the sustainable protection of means of existence. The evidence cited is that in the context of saving water even the director of the Scientific Information Center of the ICWC only referred to the possibility to provide other sectors with the surplus (Herrfahrdt 2004: 100).

Distribution: The regulation of water withdrawal is not only a problem between the headwater and the underflow countries, but also among the states bordering underflow countries. The proportion of water each country is allowed to extract is in fact laid down in multilateral treaties on basis of the available water quantities for the Amudarja and the Syrdarja (see table 2) and monitored by the Interstate Coordination Water Commission (ICWC).

Table 2: Country quota for the water runoff of the Amudarja and the Syrdarja (in per cent)

State	*Amudarja*	*Syrdarja*
Kazakhstan	0	38,1
Kyrgyzstan	0,4	1,0
Tajikistan	13,6	9,2
Turkmenistan	43,0	0
Uzbekistan	43,0	51,7
Total	*100,0*	*100,0*

Source: O'Hara (2003): 23

Despite not being designated as such, the Aral lake by now is considered an entitled user itself[20]. The literature, however, holds a number of contradictory views on this entitlement[21]. Moreover, apparently

[20] Wegerich (2005) quotes an inofficial talk with an employee of the BVO Urgentsch, according to whom the Aral Lake is acknowledged as an independent user. The lake is expected to receive an annual influx quantity of 3,5 km³ from the Amudarja.

not all parties comply with the water withdrawal limit despite the monitoring by the BVOs. Wegerich quotes an inofficial data set of the BVO Amudarja on the annual water consumption in Tajikistan, Turkmenistan and Uzbekistan (1991-2001) which was compiled from data of the gaging stations. According to this, neither Tajikistan nor Turkmenistan consumed more water in the period from 1991 to 2001 as granted by the 1987 protocol[22]. However, as the inofficial data reveals, Uzbekistan withdrew more water than it was entitled to by the protocol from 1987. Thus Uzbekistan violates the protocol and infringes the subsequent agreements which were reached after independence of the states and confirmed the annual quota distribution (Wegerich 2005: 210). However, due to the publication policy of the BVO it remains unclear whether the contracting parties actually know how much water they and the riparian states withdraw. The comparison of the official and inofficial data also suggests that less water was feeded to the Aral lake in the drought years 2000 and 2001 as officially stated. Fundamentally, the data divergency hints at a general problem - the lacking or even nonexisting exchange of information and data as well as the weak mutual trust between the offices concerned (Giese et al. 2004: 36).

The examination of the problem dimensions depicts the complexity of water management in Central Asia. Looked at from game theory, the inner state and international conflict constellations point at a 'Catch-22 situation'[23]: The water is running short. The problem is identified, first measures such as price fixing are taken. Still, when retaining the economic structure and the product range more water is needed for the further development. These pressure or stress factors are aggravated by a high population growth, the complexity of the prevailing economic and social problems[24] as well as a lacking multilateral involvment of Afghanistan and China. The only viable solution to realize sustainable water use can only be provided by networked approaches which aim at an integration of the development interests, the creation of binding conflict resolution and settlement mechanisms as well as an efficiency increase of water use. One-dimensional corrections could eventually lead to a worsening of other parameters: „It seems that the water-climate-environment-demographic situation in Central Asia in many ways resembles a hydra-headed crisis. This notion refers to situations in which the resolution of one problem usually generates other new problems, which are equally as difficult to resolve (Glantz 2002: 32)." In view of this starting position it already has to be regarded an achievement of the states involved that so far no long-lasting and violent conflicts have broken out in this region, which some experts see ‚threatened as no other on the world by resource conflicts' (Smith 1995: 351). In the following, the legal and institutional instruments will be analysed which partially ensured this. Starting from the present deficits of this framework in regard to sustainable water management, a variety of reform approaches is discussed subsequently.

5 Legal and institutional framework

A number of regional arrangements stemming from the Soviet time, such of which aimed at an increased sustainability of water management in Central Asia, still have some validity as reference points. International conventions of the Soviet Union, however, were rarely maintained, as for example the Soviet-Afghan border agreements (1946 and 1958), with which a commission was established on questions of the use and quality of the border waters. After 1991 the responsibility for the shaping of this forum devolved to the succession states of the Soviet Union, who made relatively little use of it. At

[21] Notwithstanding the documented distribution, Giese et al. write that the Turkmen limit for water withdrawal from the Amudarja läge at 35,8 per cent and was continually exceeded by the Turkmen side with lately 41,5 per cent (Giese et al. 2004: 11). Allegations made by the Uzbek side against Turkmenistan seem to be based on similar figures.

[22] However, the assertion that Turkmenistan did not increase its water consumption is contradictory to the latest complaints issued by Uzbekistan (Wegerich 2005: 210).

[23] Catch 22 is a dilemma in which one option to act excludes the other with the result of seemingly no promising options.

[24] The Fergana valley is prototypical in this regard, as the diversity of problems is further aggravated by a precarious demarcation (Krähenbühl / Gely / Herren 2002).

least Afghanistan is not included in the utilization and distribution arrangements of the Aral Lake basin (Zonn 2002).

During Soviet time the water mangement was subject to the central planning of the Moscow ministries. Water management primarily comprised utilization and distribution matters as well as infrastructure measures, but not water quality. During the droughts in the 1970s the central distribution plans were ignored locally, bringing Moscow's ministry officials into the arena. In 1986 the BVO Amudarja (Urgentsch) and the BVO Syrdarja (Taschkent) were founded to monitor the water distribution guidelines on the regional level – one of the few institutions to survive the Soviet Union (McKinney 2003: 195).

Shortly after their independence, the five new Central Asian republics signed an „Agreement on the cooperation in the management, utility and protection of the interstate water resources" in Almaty in February 1992. The main achievement of the agreement was the establishment of the Interstate Coordination Water Commission (ICWC), which was assigned a control mandate to preserve the shared water resources. The BVOs were beared out in their tasks and designated to support the ICWC in carrying out its tasks, which for the first time also comprised measures for the protection of the water quality alongside the distribution of water utilization and the control of its compliance. The state leaders capitalized on this propitious momentum by creating further interstate institutions between 1993 and 1995 (Vinogradov / Langford 2001):

- The Interstate Council on the Aral Sea Basin (ICAS) with an executive commitee (EC-ICAS) and a secretariat as organ of the coordinated policy formulation and intersectoral coordination between the areas water use, agriculture and energy supply,
- The International Fund for the Aral Sea (IFAS) for the financing of ICAS and for the coordination of the funds which are provided by the members states, donor states and international organisations, as well as
- The Sustainable Development Commission (SDC), concentrating on ecological and socio-economic aspects.

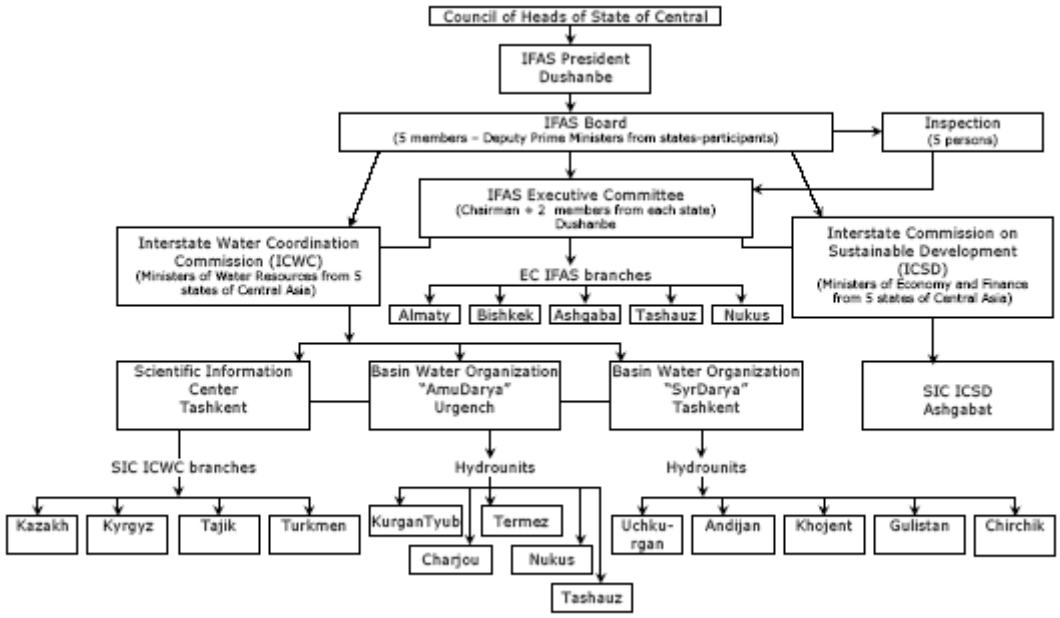
These institutions are partly intended as implementation instruments of the Aral Lake agreement of 1993, a fact explicitly referred to in the final declaration of the conference of Nukus (1994) which was initiated by the development program of the United Nations (UNDP)[25]. Within the framework of numerous agreements the treaty states subsequently made genuine efforts to remove obscurities in the distribution of functions and competences and to redress general discrepancies. In 1997 ICAS and IFAS merged into a new IFAS with a board of the deputy prime ministers functioning as consultation organs as well as an executive commitee functioning as an advisory board. The temporary end of these efforts was marked by the agreement on the current structure of the institutional network relevant for water issues (see figure 4) and its competence distribution, reached at the summit of the heads of state in April 1999 in Aschchabat. The Syrdarja agreement (1998) between Kazakhstan, Kyrgyzstan and Uzbekistan took up the water-energy-swap again, albeit without developing sustainable control effects so far (see above, chapter 4).

The institution cluster of the ICWC (with the BVOs and a scientific information center) was subordinated to the IFAS. Yet overlapping competencies and inconsistencies could not be fully dispelled (Vinogradov / Langford 2001). Generally, though, the work-sharing is followed through, whereby IFAS takes over political and financial tasks, is reponsible for the allocation of resources and shall ensure the coordination of national measures to relieve the ICWC of the overall workload, which primarily consists of the implementation of the mutual agreements, ranging from the determination of the annual water distribution quota (the Aral Lake being a ‚beneficiary' alongside the treaty states), the supervision of their

[25] Besides UNDP, the World Bank also got involved early with a cooperative and coherent cooperation in the management of transboundary water resources in Central Asia. A cornerstone is the Aral Lake basin program from 1995. The European Union, the Asian Development Bank and a number of development organisations (in particular USAID, Swiss) are very active in this area. A summary of the international engagement is provided by Sehring (2004: 13 ff.). Her criticism of the involvement of international organisations can be boiled down to the following key words: Lacking coordination and integration (q.v. Valentini et al. 2004).

compliance, data collection and research to training and consultation tasks for national authorities. In terms of the control of water quality, however, the ICWC has no binding competencies. Generally, the implementation of the decisions by IFAS and ICWC often suffer from an insufficient legal basis, diverging interests of the states and mutual distrust, lacking exchange of information, the bad technical equipment and lacking competencies of the executing authorities (Wegerich 2005; Ibrakhimov 2004). Formally, the IFAS is the only organisation which all Central Asian succession states of the Soviet Union are members of. But since the declaration of Nukus (1994) Turkmenistan withdrew from multilateral, regional cooperation endeavours and has since more or less practiced the ‚politics of the empty chair'. On the bilateral level Kazakhstan and Kyrgyzstan signed an agreement in 2000 on the use of the Talas and the Chu, which provided that Kazakhstan takes over some of the costs for the hydrotechnical facilities in Kyrgyzstan. China, which is taken into consideration just as little as Afghanistan in the regional system, in principle insists in exclusively solving all questions regarding transboundary water use bilaterally, such as in the agreement with Kazakhstan in September 2001, for which the Kazakh side granted China the withdrawal of 10 per cent of the Irtysch water (Giese et al. 2004: 35f.). For the Ili, this agreement envisages a regaulation at a later time. Moreover, a joint intergovernmental working group meets annually to foster the exchange of information and data. Up to date it was primarily concerned with understanding the current situation, to reach an agreement on the determination of the measuring points and measuring instruments, to determine a standardized measuring methodology as well as measuring parameters and to organise the exchange of information – without doubt an important basis for possible agreements in the future. Kazakh researchers, however, criticize the ineffectiveness of the Kazakh-Chinese consultations taking place every year (RFE/RL 2004). Moreover, the Chinese ambassador has already indicated in Kazakhstan that in view of further development plans for Xinjiang the water demand from the Irtysch could rise up to 40 per cent in the future.

Figure 4: Institutional network for water management in Central Asia



Source: Dukhovny / Sokolov 2003: 19.

Generally, the instutions created find little acceptance or are preceived as onesided stakeholders[26]. Furthermore, the lack of effective and accepted instruments of conflict settlement also reveals the lacking judicial coherence and precision on the agreements reached so far (Wegerich 2005). The Aral lake agreement of Almaty (1992), for example, passes processes of conflict resolution on to the level of

[26] It is tempting to draw conclusions from the seat and national composition of institutions on the lacking independence and transnational obligation. Thus both the BVOs and the ICWC are based in Uzbekistan, and Uzbekistan is represented disproportionately high in those institutions.

interministerial negotiations, without providing for provisions such as an interstate and independent board of arbitration for the case that the minister in charge cannot reach an agreement (Votrin 2003: 13). In addition, the existing intergovernmental insitutions are chronically underfunded as the member states do not meet their payment obligations.

No Central Asian state has so far ratified the UN-Convention on the Law of Non-Navigational Uses of International Watercourses (1997), which calls upon the abutters of transboundary waters not only to develop judicial agreements on a joint water management but to equip joint management mechanisms with the highest-possible degree of independent decision-making power. Only Kazakhstan ratified the preceding UN-Convention on the Protection and Use of Transboundary Watercourses and International Lakes (the so-called Helsinki convention 1992), documenting the lacking willingness for a sustainable and effective regional cooperation. The question of who pays how much for the maintenance and expansion of the infrastructure (dams, canals) is not arranged bindingly. Equally unsolved is the question of water quality such as through the provision of common minimum standards for sustainable water management as well as the regulation of backflows from irrigation areas on the regional level (elution of fields treated with herbicides and pesticides). Basically, only the continuation of the structurally unsatisfactory Soviet quota distribution offers a fairish mandatory framework for water management in the region.

On the national level in Uzbekistan and Kyrgyzstan, the land and water management ministry is responsible for water management, in Kazakhstan the environment ministry. In Tajikistan and Turkmenistan there are special ministries for water management. The Turkmen ministry has already been disbanded twice since independence and reconstituted again. In ongoing land law reforms, which are developed furthest in Kazakhstan and Kyrgyzstan, implemented weakly in Usbekistan and only rudimentarily in Turkmenistan, necessitated a reorganisation of water use on the local level. All republics except Turkmenistan introduced fees for irrigation water. However, the levy is complicated by a lacking monitoring and bad technical equipment. Equally, water use associations (Assotsiatsii Vodopolsovatelej, AVP) were established in all states except Turkmenistan since the mid 1990s, a union of all farmers withdrawing water from a particular canal system. In the ideal case the AVP is scheduled to operate its canal system on its own. For this, the AVP places supply quantity contracts with the district administrations (Hokimjat or Hukumat), for which it pays a fee, which it in turn levies from the farmers (Severing 2004: 312). The development of the AVPs is most advanced in Uzbekistan and Kyrgyzstan, but even here their legislative basis is weak and riddled with loopholes. For water distribution this in many cases means that only „the strongest, quickest and most impertinent (but well connected) users“ gain access (Holm-Müller / Zavgorodnyaya 2004). Corruption and local power structures hinder the implementations of reforms on the district level (Jones-Luong 2003). Conflict resolution mechanisms for the water distribution exist on paper, but are rarely put into practice. As indicated, Turkmenistan lacks any kind of approach to strengthen local regulation instances or to integrate the water consumers in a participatory manner.

6 Approaches to sustainable water management

Of course vast quantities of water could be saved when the required money and commitment would be invested in the modernisation of line systems. The aspects of water management were long enough reduced to technical question. Hence, the concluding remarks on improvement approaches will rather concentrate on political-institutional considerations.

Currently, water management is characterized by unilaterist leanings which are only kept in check by bilateral arrangements with limited regulation and implementation capacities if at all. Due to the natural resource distribution in the region a strengthened integration within energy and water supply is deemed sensible. But despite some lip service it still is not in the interest of most governments. Thus the countires of Central Asia economically compete for the same scarce resources and follow independent development strategies (Ilkhamov 2002). In the long run, though, an institutionally, judicially and

politically integrated approach is indispensable to prevent the structurally inherent conflict potential from erupting in longlasting conflicts (ICG 2002). However, this can only happen step by step. With the existing transnational institutions IFAS and ICWC a starting basis is already in place. These need to be equipped with efficient monitoring mechanisms and mandatory sanction powers against offences and unilaterist leanings. Moreover, all states must fulfil their payment obligations for the financing of the common institution system. However, these institutions will only be able to exercise these competences if they are accepted as largely independent boards of arbitration and information and if they are sufficiently funded. Then the current déjà-vu of interstate negotiations could be overcome in the future. Fundamentally, all user and riparian states, including Afghanistan and China, need to be invited to a cooperative management and need to take up that invitation.

In the case Afghanistan the question was raised whether the country could not sell off the water capacities it was entitled to by international agreements (such as the Helsinki convention) since it was not going to have sufficient water use capacities in the foreseeable future (Glantz 2002: 28). It is highly questionable in a number of ways, though, that this idea can be put into practice. First, the northern neighbours affected by this plan, Uzbekistan and Turkmenistan, have not signed the aforesaid international conventionen. Thus from this point of view they do not have to see a basis for "legitimate" claims on behalf of Afghanistan. Second, the commercial weight of a resource that was not used so far and the use of which will not yield the targeted revenue in the future is rather limited. Hence it would rather constitute a measure of direct development aid based on good will on behalf of Uzbekistan and Turkmenistan if both countries were to compensate Afghanistan for the disuse of its water resources due to lacking capacities (in contrast to its voluntary renunciation). Agreements on other lake basins beyond the Aral lake have to incorporate mandatory structures and institutions capable of acting and to involve China. However, this essentially depends on the willingness of China to revise its bilateral and non-institutionalized regulations. China will also have to contribute more to the expenses of water use in the future.

On the national level, first small steps to a sustainable water management in the entire region as outlined above would be the creation of a judicial basis for the establishment and promotion of water consumer organisations. The participatory involvement of WUAs in water management has to be accompanied by better financial equipment, a clear assignment of competences and the strengthening of regional institutions in comparison with local bureaucracies. These measures could contribute to reduce corruption and clientelism. Stronger incentives have to be provided to the water consumers to use the resource economically – not only the direct consumption costs, but also indirect incentives such as the liberalisation of the cotton industry. In border regions local initiatives should be developed and promoted for transboundary management. In the long run these measures could find a spill-over resonance in other regions. In the course of the Millenium Development Goals organisations of the international development community are already increasingly supporting local initiatives. Yet international donors often face the accusation of simply racking up vast quantities of uncoordinated projects, and thereby creating redundancies leading to a proliferation of non-governmental organisations (NGOs) and assumed NGOs who are in fact created by governments themselves[27], who in part act with the same activities as implementation partners for several international organisations (Vaux / Goodhand 2001). The international community has to coordinate its action better in the future. Only that way it will be able to impose pressure upon decision makers, which could contribute to a strengthened willingness to compromise in the long run.

Transboundary water management also has to be embedded in a comprehensive economic cooperation which accounts for all areas dependent on the resource water. Water is a cross-cutting issue since it necessarily also affects energy supply, agriculture, food production and trade, the infrastructural and industrial extension as well as the drinking water supply. Thus these policy fields have to be addressed in an integrated manner both in the regional economic cycle as well as in the national plans. Only the economically integrated approach opens up the possibility for turning away from irrigation intensive products such as cotton and rice to less demanding products such as wheat and maize. Similarly, a just

[27] These organisation are frequently called GONGOs (government owned non-governmental organizations - vgl. Dukhovnyj / Sokolov 2003; Sehring 2002).

and efficient price fixing for the resource water accounting for the costs of infrastructure maintenance and advantages by means of allocation can only be realized on the intergovernmental level.

Taken together, this of course is an ideal objective which can only be realised step by step. The current cooperation behaviour on the intergovernmental level still casts doubts on the feasibility of these targets in the near future. The reinforced integration on the regional level has to be preceded by the willingness to compromise on behalf of the national development strategies towards a political and economic opening. For some of the existing regimes, though, this is synonymous with the loss of control; hence there is little prospect of change in the patterns of action. Starting points for a longterm and coordinated engagement of development cooperation should therefore be placed in the local, transnational area, even if an effective distribution system including all states affected will be inevitable in the future.

Despite all skepticism it should be recapitulated that a number of upgradable instruments have already been established and that water conflicts have not yet reached the dimension they were feared to develop at the beginning of the 1990s. In view of the complex situation small steps on the bilateral level already are a big success which need the international support to ensure their durability and effective implementation.

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