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Zuzana Kopajová

The Factor of Water in Central Asia

Diplomová práce

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Autor práce: **Zuzana Kopajová**

Vedoucí práce: **PhDr. Slavomír Horák PhD.**

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Anotace

Diplomová práce *Faktor vody ve Střední Asii* přináší analýzu fenoménu přes-hraniční vodní interakce v povodí Aralského jezera. Zvláštní pozornost je věnována vznikajícím mezistátním a regionálním politickým vztahům, které souvisejí s otázkami mezinárodního hospodaření a bezpečnosti na vodních tocích - Syrdarja a Amudarja.

V současných globálních debatách o mezistátní vodní politice rezonují různé teoretické rámce pro analýzu. Předkládaná práce tyto přístupy zkoumá, například: integrované vodohospodářství (IWRM), enviromentální bezpečnost nebo teorie o vzniku hydro-hegemonii; se záměrem najít optimální metodologii pro naše případové studie.

Následně je tato teorie aplikována na konkrétní vyjednávací konstalace v povodí středoasijských řek. Případové studie na řekách Syrdarja a Amudarja ilustrují například tyto rozpory: (1) mezi státy na horním a dolním toku řek; (2) mezi zavlažováním a vodními elektrárnami; (3) mezi vodou a energetikou; (4) mezi geopolitikou a mezinárodním právem; (5) mezi celostátními a regionálními otázkami.

Vodohospodářská situace ve Střední Asii je zasazena do geopolitického kontextu, a vnímaná v souvislostech rozvoje lidského a ekonomického potenciálu, v daném kulturně-historickém pozadí a přihlíží také na možné výzvy do budoucna. Zajímavé jsou dále obecné tendence v členských státech SNS, dopady Aralské katastrofy a aktuálně „souborná vodo-energeticko-potravinová krize“ (zima 2007/08).

Annotation

The final thesis *Factor of Water in Central Asia* presents an analysis of the phenomena of trans-boundary water interaction in the Aral Sea basin. Particular attention is given to the emerging political inter-state and regional affairs, connected to international management and security at Syr Darya and Amu Darya rivers.

Global hydro-politics debates offer various theoretical frameworks of approaching the inter-state water relations. Theories such as Integrated Water Resource Management, Environmental Security and Hydro-Hegemony are explored with the ambition to find a comprehensive research background for our case studies.

Thereafter, the theory is applied to the particular negotiating constellations in the Central Asian water basins. The case studies at Amu Darya and Syr Darya rivers illustrate several interesting cleavages, for example between: (1) upstream and downstream riparian states; (2) irrigation and hydropower; (3) water and energy; (4) geopolitics and international law; (5) national and regional affairs.

Central Asian water situation is perceived in the context of geopolitics; economic and human development; culturally-historical background and future potential challenges. Further we present, the overall tendencies in the Newly Independent States, consequences of the Aral Sea catastrophe and the recent "compound water-energy-food crisis" (winter 2007/08).

Klíčová slova

Střední Asie, trans-hraniční politika vod, povodí Aralského jezera, Syrdarja, Amudarja, integrované vodohospodářství (IWRM), enviromentální bezpečnost, hydro-hegemonie

Keywords

Central Asia, trans-boundary water politics, Aral Sea basin, Syr Darya, Amu Darya, Integrated Water Resources Management (IWRM), Environmental Security, Hydro-Hegemony

Prohlášení

Prohlašuji, že jsem předkládanou práci zpracoval/a samostatně a použil/a jen uvedené prameny a literaturu. Současně dávám svolení k tomu, aby tato práce byla zpřístupněna v příslušné knihovně UK a prostřednictvím elektronické databáze vysokoškolských kvalifikačních prací v repozitáři Univerzity Karlovy a používána ke studijním účelům v souladu s autorským právem.

V Praze dne 22.května 2009 Zuzana Kopajová 

Obsah

Introduction

Water has no taste, no colour, no odour; it cannot be defined, art relished while ever mysterious. Not necessary to life, but rather life itself. It fills us with a gratification that exceeds the delight of the senses.

Antoine de Saint Exupéry, "Terre des hommes"

Aim and Structure

Presently, during the Czech Presidency of the European Union, we mostly read about Central Asia in the context of European energy security. The researches of the Institute of International Studies at the Charles University in Prague engage in presenting the Central Asian region holistically. Solid contributions have been made at the Institute by defining the overall geopolitical setting, with the external power influences and potential conflict factors. Following up on this research, we wish to present an addition factor[1] – Water.

The Factor of Water in Central Asia is a puzzling one. When offering the Water approach as a complementary supplement to the pure Energy approach, there is a need to find a reasonable balance, because neither overstating, nor undervaluing the meaning of water is desirable. For our purpose, the Factor of Water is understood as a phenomena influencing political, economic and human development. *The paramount aim set in this thesis is to examine the trans-boundary water interaction in Central Asia.* We are mainly interested in how water determines the political interstate and regional affairs.

Some of the initial research questions were: How can we approach a trans-boundary water basin in a comprehensive way? Is there an effective manner of combining the politics and hydrology research? What needs to be considered, when dealing with international basins in the Newly Independent States? Were there any

[1] Naturally, we bare in mind also the other pressing factors influencing the current and potential development, those being for example: unresolved minority and border issues, narcotics and international crime, high corruption rate, Islamic extremism, possible separatism, Afghanistan, demographic and social problems, global warming or authoritarian tendencies. All of the above mentioned security challenges have their implications also on the Factor of Water in Central Asia and will be looked upon in this context.

integration tendencies around water resources after the dissolution of the Soviet Union, or did the countries pursue solely their individual interests? Could water allocation and distribution contribute to rivalry and disagreement at an international level?

Moreover, we were interested whether the unequal distribution of scarce natural resources influences the contemporary international relations in the region. Does the Factor of Water contribute to rather conflict or cooperation? Eventually, could a war be fought over water in Central Asia, or conversely, does water promote peace and solidarity?

The original hypothesis was articulated as follows: *The upstream and downstream states in Central Asia use leverages against each other, in order to attain their national interests.*

Logically, schematically put, the upstream and the downstream states in Central Asia should have contradictory ideas of how to manage the shared water resources. The water-rich and energy-poor upstream states (Tajikistan, Kyrgyzstan and perhaps Afghanistan) would probably seek to utilize their water resources to generate energy and the rather-energy rich and water-poor downstream states (Uzbekistan, Kazakhstan and Turkmenistan) would probably employ in extensive irrigational agriculture. How to find a consensus when the emerging national interests between the upstream and the downstream states becomes antagonistic? How relevant is actually the cleavage between the upstream/ downstream riparians? Which are the other relevant indicators contributing to the trans-boundary water interactions in Central Asia?

When defining spatially the region of Central Asia, we take into account the political delimitation that includes the 5 post-Soviet Republics: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. [2] Simultaneously, the basin-perspective is considered, which is best expressed by the Aral Sea basin watershed area, or eventually the two sub-basins Syr Darya and Amu Darya basins. Many water-related studies have specialized on the Ferghana Valley, as this area vividly illustrates some of the most interesting tendencies, within the region.

[2] Many authors do not consider Kazakhstan as a part of Central Asia. In Russian there are two terms to express the differentiation: "Srednaya Aziya i Kazakhstan", "Tsentral'naya Aziya".

Structurally, the final thesis was divided into two main chapters. The first chapter gives a theoretical background necessary for the explanation of trans-boundary water politics. The second chapter is dedicated to the region of Central Asia, analyzing the trans-boundary water politics in practice. Within the thematic framework of Chapter 1, we will employ two approaches, Management and Security. The practical application of the theories was tested on the river basins of Syr Darya and Amu Darya.

Stemming from the Central European region, the author feels that she is given a certain potential for a better understanding of the Factor of Water in Central Asia. This belief derives from a set of conditions, such as, that the Central European region provides the sole example, when two riparian countries - Slovakia and Hungary turned to the International Court of Justice in the case pertinent to international waters - Gabčíkovo-Nagyamaros (1997), which was a up-to-date a precedent in trans-boundary water politics. Secondly, this year, Slovakia took over the Presidency of the International Commission for the Protection of the Danube River (ICPDR), the Danube River Basin being the world's most international river basin, including the territories of 19 countries. Thirdly, the newly established UN Regional Preventive Diplomacy Centre in Ashgabat, Turkmenistan is headed by a Slovak diplomat Miroslav Jenča, and within the agenda of the so far unique Centre, a prominent role is given to the Central Asian water-energy issues.

Methodology

At the initial stage of the final thesis preparation we employed the classical analytical method. We strived to gather all the existing case studies, books, findings, research, reports and articles available. After the collecting of the information resources, followed the sorting, studying and summarizing. Next we endeavored to acquire the prerequisite knowledge necessary for the implementation of an interdisciplinary approach. Basic familiarity with hydrology; theory of international relations, in particular on international water regimes; and global water debates was crucial. There-after followed the stage of internships, correspondence, interviews and consultations.

To better tune in to the "genius loci", the author traveled repeatedly to Central Asia, where she became completely overwhelmed and fascinated by the local aqua-systems. During her internship at the Lomonosov Moscow State University, Institute of African and Asian Countries, at the Centre of Caucasus and Central Asia, she enrolled in a basic Kyrgyz language course, in order to approach moderately the logic of Turkic languages. Further, the Centre Directed by Zhibek Saparbekovna Sizdikova (Kazakhstan), offered courses and roundtables on contemporary and past Central Asian affairs. Of particular significance was the presentation of the Director on the topic of Water Resources in Central Asia. In Moscow, very valuable was the personal consultation with Andrej Grozin, the Director of the Department of Central Asia and Kazakhstan, Institute of CIS countries, who published a series of articles on relevant water and energy issues of the region. Further, the repeated visit of the Moscow Carnegie Centre can be considered fecund.

For the application of the theoretical cognition into practice, the author volunteered in the Bratislava Regional Centre of the United Nations Development Program, as an assistant to the international consultant in Environmental and Security Initiative implemented in the Ferghana Valley. From Juerg Staudenmann, the water governance specialist for the CIS region, she learned about the water-wiki.net and Ajiniyaz Reimov (Uzbekistan) familiarized her with the most pressing regional environmental security challenges. Presently, the second phase of the ENVSEC initiative was launched, that focuses on the East Caspian Sea region.

As a preparation for the Fifth World Water Forum in Istanbul, the author participated in the regional process on Water Vision for Europe. Very fruitful was the consultation with Mr. Milan Matuška, from the Regional coordinator for Global Water Partnership in Central and Eastern Europe. The "mega-conference" held in Istanbul on March 16-22, 2009 was named Bridging the divides for water. The World Water Forum is the biggest water-related event, held every 3 years, and this time it gathered more than 30 000 participants – a perfect platform for networking and conducting interviews with representatives of academia, NGOs, but also technical experts and politicians. Two exceptional experiences were meeting the President of Tajikistan, Emomali Rahmon in person and paying a tribute to Professor Victor Dukhovny, to his anniversary. The author conducted about twenty interviews, the most crucial being, with:

- Vadim Sokolov - Deputy Director of Scientific-Information Centre of Interstate Coordination Water Commission
- Olli Varis - Senior Researches at the Water Resources Laboratory of the Helsinki University of Technology
- Francesca Bernardini - Secretary of UNECE Water Convention
- Nina Chkhobadze - Chair of Global Water Partnership, Caucasus and Central Asia
- Sulton Rahimov - Head of Department of Environment and Emergency Situation at the Executive Office of the President of the Republic of Tajikistan
- Nikolay Aladin - International Lake Environment Committee Foundation, representing the Russian Academy of Sciences

Hereby, she sincerely thanks all the above mentioned professionals.

Literature

Although the topic of Central Asian trans-boundary water resources sounds seemingly minor, in English, German and Russian there is a quantum of works of various quality published on this theme. It is necessary to select away the popular journalism and works affected by evident business interests. Bearing in mind, who published a certain piece and why, is particularly interesting when dealing with local authors.

Let us now present shortly some of the chosen authors who's works we appreciated greatly for the purpose of our final thesis:

- Asit K. Biswas, one of he the establishers of the International Water Resources Association and World Water Council, published some influential articles on Integrated Water Resource Management that were utilized in the theoretical part of this thesis

- Philip P. Micklin wrote plentifully on the Aral Sea Crisis. He is a widely cited author in particular the Special Issue of the journal Post-Soviet Geography is often referred to
- Stuart Horsman's contribution to a famous book edited by Lena Jonson, on Central Asian security, dedicated to regional water cooperation and conflict is based on the then novelty framework of environmental security
- Erika Weinthal, an associate professor of political sciences at Tel Aviv University and expert in environmental policy, wrote a remarkable book on linking domestic and international politics in Central Asia, called State Making and Environmental Cooperation. Also, she prepared the background paper for the UN Human Development report 2006, on water conflict and cooperation in Central Asia.
- Johannes Linn, a former World Bank vice president for Europe and Central Asia, representing presently the Brookings Institution, specializes among other topics in transition in Central Asia and explained in a comprehensive way the causalities behind the "compound crisis" in Tajikistan
- Kai Wegerich, the assistant professor for irrigation and development at the Wageningen University, focuses on water management in the Aral Sea basin. He is highly respected among the Central Asian academia and known for his prolific and erudite publication activities

Three more distinct publications will be mentioned here because of their exceptional asset to the studied subject. The first one is a report produced by the International Crisis Group in 2002 called Central Asia: Water and Conflict. This report made recommendations and observations that seem timeless even today. The second work, being of different genre, is the Aral Sea Encyclopedia, published this year by the Springer Verlag. As the main advantage of this Encyclopedia we perceive the alphabetical listing of the relevant headwords. We welcomed this when giving the introductory remarks to chapters on Aral Sea catastrophe, Syr Darya and Amu Darya. Last presented publication here is the Helsinki University of Technology piece named Central Asian Waters: Social, economic, environmental and governance puzzle. A platform was formed with the intention to involve young professionals from Finland

into research and subsequently to form cooperation with young professionals from Central Asia. We consider the idea novelty and inspiring.

Just to give a rough idea about what kind of institutes and research cliques are involved in inquiry of the region of Central Asia (Central Asia-Caucasus Institute Silk Road Studies Program at John Hopkins University; Institute for Central Asian and Caucasian Studies in Sweden), in the topic of trans-boundary water management (Oregon State University, London Water Research Group, Toronto Group, ENCOP, PRIO). For example the Justus-Liebig University in Giessen published a series of research papers that involved the connection between water and Central Asia (Jenniver Sehring and Alexej Trouchine). The work of some local research institutes should be highlighted: in Kyrgyzstan IPP and in Uzbekistan the Scientific-Information Centre of ICWC.

More widely, various information portals are being used. We found the CAWATER-info portal within the CARWIB project particularly helpful. The CARWIB is funded by the Swiss Development Agency and implemented by the SIC ICWC in Tashkent. It improves availability and transparency of information exchange on water and environmental sectors in Central Asia, compiles a water-news digest from the Central Asian mass media and produces abundant quantity of publications, all available online within the Electronic Library of SIC ICWC (e.g. ICWC Bulletins). Further the CARWIB encourages local researchers, coordinates donor activities, and even includes an information system for water management in Aral Sea basin. Currently there are plans to implement the experience from Central Asia into other CIS trans-boundary water basins.

Another interesting project is the already mentioned water-wiki.net, produced by UNDP that works as an inter-active knowledge map and as an on-line collaboration platform for water practitioners. Also within the 5th World Water Forum the Virtual Meeting Space was launched, to connect water professionals. Moreover, we would like to mention the portal Ferghana.ru, where in the special section for water issues, interesting discussion threads emerge, when regionally respected scientists react one to another's articles. Additionally, we utilized also the information hubs RFERL and

EURASIA.NET. Sometimes, in prestigious journals such as Water Policy or Water Alternatives, we find articles relating to the Central Asian region.

Valuable sources of information are the electronic databases such as JSTOR, or EastView. SpringerLink is a database of journals and books published by Springer and for our research it was widely used. Book series such as NATO Science Series or Earth and Environment Science Series can be downloaded freely. Furthermore, SpringerLink supports the featured libraries: Chinese Library of Science and Russian Library of Science.

Various international organizations are involved in researching different aspects of Central Asian water resources. The UN has created UN Water, to unite under one umbrella all the initiatives, for better coordination of activities and mitigation of duplication of work of the different agencies. Individually, the prominent projects worth mentioning are for example the UNECE Special Programme for the Economies of Central Asia (SPECA) or the UNESCO Potential Conflict into Cooperation Potential (PC-CP). Also the work of INGOs is valid in the Central Asian water context, for example the Global Water Partnership (GWP) or World Water Council (WWC). Further, the publications produced by financial institutions (World Bank, Asian Development bank, Eurasian Development Bank), or national development agencies (SDC, CIDA, GTZ, USAID) were utilized.

In our research we also worked with primary sources, such as the legally binding Intergovernmental Agreements, Protocols, International Agreements, Declarations and Statements of the Heads of Central Asian States.

Overall it can be said, that the state of research of the subject, by Central Asian authors is more relevant for historians or technical staff, than for students of contemporary international relations. Water governance issues and the bilateral political agenda tend to be looked upon subjectively, depending on the origin of the author. Rarely, we see internally driven initiatives of regional scientific cooperation. Hopefully, the establishment of the Water-Energy Academy will improve this situation. Sometimes, collections of articles or speeches from conferences are published together, usually supported by foreign financing.

The problems of international research and policy recommendations are well summarized by Jochen Froebrich and Kai Wegerich.[3] They claim, that the main challenges are the (1) language barrier (when during the process of double translation to Russian and to local languages, there are significant transmission losses of the meaning); (2) access to data (hydrological data often having political implications); (3) "wikipediarism" (limited credibility of findings); (4) smattering (quick sketches instead of deeper insight); (5) outdating (danger of knowledge loosing aging as soon as it is produced). As one of the possible solutions is the call for improved financing of academia (there is a generation of lost experts and a danger of heritage loss). Signs of positive development are the increased usage of electronic libraries, subscriptions to international journals and international cooperation (e.g. Wageningen Institute of Irrigation and Melioration BMBF/UNESCO Khorezm).

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Thank you,

Professor Ivanička for introducing me to Synergetics

Kristínka for belaying my ropes

My dear parents and precious sister for everything

[3] FROEBRICH, Jochen; WEGERICH, Kai. **The fog problem in Central Asia – Deficiencies in international community research to support water and food security**. Springer Science, Irrig Drainage Syst Vol. 21, № 3-4, Dec 2007, p.161-165, WWW: http://www.springerlink.com/content/5827846114217g85/fulltext.pdf

1. Trans-boundary Water Basins

Water is by nature a fluid substance that flows irrespective of borders and crosses boundaries, be they of political, economic, technical, legal, cultural, religious or virtual kind. This Chapter aims to find a suiting theoretical background for assessing the trans-boundary water basins.

We will start of by presenting several hypotheses that will help us phrase the research question more clearly:

1) Trans-boundary water resources can be studies from two distinct main ideal perspectives: Management and Security.

2) Management perspective is mostly applied at expert level and deals mainly with technical questions.

3) Security perspective is mostly applied at high level and deals mainly with strategic questions.

4) Politics affects both Management and Security and determines whether cooperative or conflict solution will prevail at Trans-boundary basins.

5) Cooperation has a conceptual superiority over conflict and is therefore more desirable.

6) Conflict can "spill over" to war and cooperation can "spill over" to integration.

Further, we would like to verify the above mentioned hypotheses and find which of the suggested approaches to research of Trans-boundary basins is more constructive and applicable in particular situations. What exactly is the relation between Management and Security approach? Can such a distinction be substantiated? How does the factor of power shape hydro-politics? What are the practical strategies to influence cooperation and conflict formation and regulation on a shared river basin?

Trans-boundary waters in broad terms cross boundaries of any type; within political jurisdiction including boundaries of sovereign entities, whether these entities are within a federalist state or among independent states. For the purpose of this study we will mostly employ the narrow interpretation of trans-boundary waters that refers to *waters that transect or/and form international borders.*

Trans-boundary waters are elsewhere defined as international, shared, cross-border or interstate waters. Following the Water Convention of European Commission for Europe (UNECE), "transboundary waters" means any surface or ground waters which mark, cross or are located on boundaries between two or more States; whether transboundary waters flow directly into the sea, these transboundary waters end at a straight line across their respective mouths between points on the low-water line of their banks".[4] Similarly, according to the 1997 UN Water Course Convention (UN WCC) we use the term "international watercourse" as watercourse, parts of which are situated in different States", while "watercourse" is hereby defined as a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus".[5]

Basin is another useful term that deserves clarification is. We use the term as "all waters, whether surface or groundwater, that flow into a common terminus", which strongly resembles the definition of watercourses given in the already cited UN WCC.[6] By definition, basins can include lakes, wetlands, and aquifer systems in addition to rivers. Colloquially, some use watersheds as smaller units, whereby many watersheds make up a river basin.[7]

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[4] **Convention on the Protection and Use of Transboundary Watercourses and International Lakes.** United Nations Economic Commission for Europe. Helsinki, 17 March 1992. WWW: http://www.unece.org/env/water/pdf/watercon.pdf

[5] **Convention on the Law of the Non-navigational Uses of International Watercourses.** General Assembly, United Nations, 21 May 1997. WWW: http://untreaty.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf

[6] Basin in US is referred to as watershed and in UK as catchment

[7] PRISCOLI, Jerome D. **Managing and Transforming Water Conflicts**. Cambridge: Cambridge University Press, 2009

Summing up the key definitions, *Trans-boundary Water Resources refer to Basins that pass through several independent States, which are called Riparian.* Although being sovereign, the riparian states on a basin level are involved in *hydrological interdependence* and therefore form relations – interact. Sharing a basin often causes tensions and poses challenges to the individual riparian states. In the context of national security, economic opportunity, environmental sustainability and fairness the trans-boundary basin contains "*potential to fuel conflict or to bridge cooperation*"[8]. Which of the two will develop between two or more co-riparian remain a very interesting question influencing and influenced by the particular settings at the basins. Scientists and scholars from various disciplines are trying to find the logic and fortuity behind whether it will be cooperation or conflict that will dominate a basin. We will attempt to contribute to this discourse.

1. 1 Management of Trans-boundary Waters

1. 1. 1 Benefit Sharing

Benefit sharing is what drives individual riparian states within a trans-boundary water basin into cooperation despite the anarchy background of international relations. It is empirically proven, that unilateral actions of riparian states within a trans-boundary water basin are often ineffective, inefficient or even sometimes impossible. States may improve their well-being by involving in cooperative actions due to the natural interdependence between states sharing a common river basin. The incentives for such cooperation are the subject matter of the "benefit sharing" concept.

The basic prerequisite of riparian states considering involving in cooperation is that the sum of perceived gains achieved through this action, undisputedly outweigh the benefits of unilateral action driven solely by individual national interests. Beside this interest consonance, the states must feel, that they are guaranteed a fair share of the overall benefits from the cooperation. The benefit sharing approach allows to bypass the often unclear and contested property rights, by switching focus from physical volumes

[8] UNDP. Human Development Report 2006. **Beyond Scarcity. Power, Poverty and the Global Water Crisis**. 2006. p. 440, WWW: http://hdr.undp.org/en/reports/global/hdr2006/

of allocated water to the quantification of the various values derived from it (e.g. hydro-power, agriculture).

Treating a river basin as a single unit is both economically and hydrologically optimal. Taking into account the condition that a full agreement of each riparian is essential we face a collective action problem which is usually explained through either public goods or game theory.

A river basin is a *common pool resource*, which differs from a public good in the aspect, that its benefits are subtractable, which basically means, that when used by one riparian the benefits available to the others will necessarily diminish. Therefore, when the water resources are managed jointly within a basin, the physical integrity of a system is maintained and the externalities are internalized.[9]

Applying the *cooperative game theory* helps us to schematically simulate the behaviour of co-riparian states and understand the strategies they pursue.[10] Taking an example of the simplest Prisoners ' Dilemma game, we have countries A and B that share an aquifer both facing a binary choice of extracting water at low/high rate.[11] They act individually, but operate however in an interdependent environment. As both prefer a high pay-off the dominant strategy of both A and B will be high rate of extraction, which might however not be the efficient equilibrium in a particular situation. If both countries would choose the low rate extraction, they would both win more, but not

[9] QADDUMI, Halla. **Practical Approaches to Trans-boundary Water Benefit Sharing**. London: Overseas Development Institute, Working Paper 292, July 2008. WWW: http://www.odi.org.uk/resources/odi-publications/working-papers/292-transboundary-water-benefit-sharing.pdf

[10] Read more: DINAR, Ariel; DINAR, Shlomi; McCRAFFEY, Stephen, McKINNEY Daene. **Bridges over Water. Understanding Transboundary Water Conflict, Negotiation and Cooperation**. World Scientific Publishing Company, 2007. p. 468 or PARRACHINO, Irene; DINAR, Ariel; FIORAVANTE, Patrone. **Cooperatiove game theory and its application to natural, environmental, and water resources issues: 3. application to water resources**. World Bank. Policy Research Working Paper, № WPS 4047, 2006. WWW: http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2006/11/21/000016406_20061121155643/Rendered/INDEX/wps4074.txt

[11] BARRETT, Scott. **Conflict and Cooperation in Managing International Water Resources**. The World Bank, Policy Research Working Paper 1303, 1994. WWW: http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/1994/05/01/000009265_3970716141014/Rendered/PDF/multi_page.pdf

knowing the choice the other, makes them pursue their dominant strategy. When a "penalty for cheating" is introduced, which means that who ever decides to extract at a high rate has to pay a compensation fee to the other riparian, the equilibrium might become efficient. However, to entirely internalize the reciprocal externalities, it is necessary to conclude a cooperative agreement that would be self-enforcing, meaning it would contain mechanisms to sustain itself.

Implementation of benefit sharing requires *suitable conditions* or incentives for cooperation. First, there is a continual proportion between the number of players involved in the negotiations and the success of cooperative outcome – with each new player the cooperation becomes more difficult. Almost all agreements in the history of trans-boundary cooperation are bilateral rather than multilateral. It is more feasible to seek cooperation in partial coalitions (subunits) of a shared river basin. "Observing multilateral agreements, treaties including all riparian countries are an exception rather than a rule."[12]

Another important condition is the homogeneity of riparian actors. Players have different capabilities (relative power, such as bargaining strength or geographical location of the basin); preferences and interests (valuation of potential costs and benefits or potential strategies applied) and beliefs or information. All those factors affect communication and ability of riparian to make credible commitments.

The best way to promote the convergence of national agendas into a joint cooperative agenda is to recognize the widest possible range of benefits. Sadoff and Grey offer an analytical framework for describing the types of benefits from cooperation on international rivers. They *systemize the benefits* into 4 distinct categories:

(1) Ecological benefits accorded TO the river (better management of ecosystems),
(2) Economic benefits to be reaped FROM the river (increase food and energy production),

[12] Ed. JUST, Richard; NETANYAHU, Sinaia. **Conflict and Co-operation on Trans-Boundary Water Resources.** Dordrecht: Kluwer Academic Publisher, 1998. 432 p.

(3) Reduction of political costs arising BECAUSE OF the river (decrease tensions),
(4) Catalytic benefits enabled BEYOND the river (economic integration of states).[13]

The extent of relative importance of each of the benefits will vary in every shared river basin. In some cases, costs of cooperative action will be greater than the scale of benefits derived. Those costs might include financial, institutional, political costs or the costs of forgone unilateral opportunities.

Focusing on trans-boundary riparian negotiations, researchers have developed certain mechanisms of how to *foster benefit sharing*. For example, technical level communication can help establishing conductive environment for further engagement and even result in political feasibility. Mechanisms which have proven helpful in this process are:

(1) Issue linkage (linking upstream and downstream issues to such issues where the power situation would be reversed)
(2) Diffuse reciprocity/ Good relations (accepting an agreement even on less favourable conditions to create a "reservoir of goodwill"),
(3) Extend the geographical scope (to include rivers where downstream river is upstream),
(4) Side Payments (providing financial compensation in return for a concession)
(5) Using international fora to introduce more ambitious national policies than would be possible through national channels alone,
(6) Exercise of power (compensate geographical interiority with other sources of power – economic, political, military)"[14]

The role of 3rd parties in supporting cooperation in trans-boundary basins and the assistance they provide in negotiating water agreements between riparian states should not be marginalized. Although nor mediators, donors nor international organizations can guarantee creating a conductive political environment for the cooperation to take place,

[13] SADOFF, Claudia W.; GREY, David. **Beyond the River: The Benefits of Cooperation on International Rivers.** In: Water Policy, Washington: Elsevier Science Ltd. Vol. 4, 2002. p. 389-403, WWW: http://siteresources.worldbank.org/EXTABOUTUS/Resources/BeyondtheRiver.pdf

[14] QUADDUMI (2008), p. 11

they can provide incentives for cooperation through technical competences and inspiration from use of best practices, they can provide experts on water issues to help conducting the negotiations or help in facilitating investments.

Benefit sharing could also involve those *compensating procedures*: (1) Direct payment for water use (e.g. municipal or irrigation supplies), (2) Direct payment for benefits (e.g. fisheries, watershed management) or compensation for costs (e.g. inundated land, pollution), (3) Benefit transfer through purchase agreements (e.g. power, agriculture products), (4) Benefit transfer through deal structure – financing and ownership arrangements (e.g. power infrastructure) and (5) Broadened bundle of benefits, including provision of unrelated or less tangible goods and services (reputation). [15]

Cooperation can have many different modes and can be situated anywhere on the continuum from unilateral action (independent, non-transparent national plans), to coordination (communication and information on national plans – cost sharing for regional assessments), to collaboration (adaptation of national plans for mutual benefits – payment for benefits), to join action (joint plans, management or investment).[16] This *cooperation continuum* is viewed upon as non-directive (more cooperation is not necessarily better), dynamic, adaptive, iterative and self-reinforcing

It is very important to keep in mind that the major stakeholders in trans-boundary river negotiations are not national states, but instead a multilayered array of actors in those states. Each of those actors presents a different perspective on benefit sharing and has own subjective motivations and interests that are not always to easy understand from the outside. Those actors can include national government bodies such as ministries, regional and local governments, civil societies, NGOs, water users, private sector, supranational organizations (such as regional integration arrangements).

[15] SADOFF, Claudia W.; GREY, David. **Cooperation on International Rivers. A Continuum for Security and Sharing Benefits.** In: International Water Resource Association. Water International, Vol. 30, № 4, December 2005. p. 8, WWW: http://earthmind.net/rivers/docs/worldbank-cooperation-international-rivers.pdf

[16] SADDOFF (2005), p. 5-7

Some researchers claim that regional integration arrangements (RIAs) which concentrate on trade issues may have little in common with regional cooperation that takes place on an ad hoc basis around specific thematic questions such as trans-boundary water management.[17] While others are trying to find what role water management can play in regional integration.[18] We will later suggest, in the neo-functionalist spirit, that regional cooperation on management of regional public goods can spill-over to further regional integration.

More difficult then the conceptualization of benefit sharing approach is the practical operationalisation. This can be encouraged by quantifying the benefits and costs, by addressing the equity link of volumetric water allocation and benefit sharing. Monitoring and evaluation work as good indicators of progress, as well as learning tools and consensus builders.

Let us now sum up, why benefit sharing may not be sufficient to achieve regional cooperation. The biggest problem of benefit sharing failure may be the lack of trust between the riparian countries. Other factors can be pride, political tensions, high coordination costs, asymmetric distribution of costs and benefits and the absence of higher authority that would guarantee the enforcement of the agreed conditions. Therefore the agreements negotiated in shared water basins should be, as mentioned before, self-enforcing, which is rather challenging.

1. 1. 2 Legal Regimes

A trans-boundary river can either feature as a boundary river, forming a natural border between two riparian states (border-demarcating) or as a *successive river* and pass through two or more states (border-crossing), which is in fact the more frequent

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[17] SCHIFF, Maurice; WINTERS, Alan L. **Regional Cooperation, and the Role of the International Organizations and Regional Integration**, Volume 1. World Bank Policy Research Working Paper, № WPS 2872, 2002. p. 40, WWW: http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2002/09/07/000094946_02081604293238/Rendered/INDEX/multi0page.txt

[18] PHILLIPS, David; DOUDY, Marwa; McCAFFREY, Stephan; ÖJENDAL, Joakim; TURTON, Anthony. **Trans-boundary Water Cooperation as a Tool for Conflict Prevention and for Broader Benefit-sharing.** Global Development Studies No.4. Stockholm: Ministry of Foreign Affairs, Sweden, 2006. p. 273, WWW: http://www.egdi.gov.se/pdf/44699_om_web.pdf [17.11.2008]

case. Some rivers are mixed, because they fall under both categories somewhere along their flow.[19]

The attention of our study will be mostly focused on successive rivers. Successive rivers, besides the already suggested symmetric common pool resource problems, can be characterised by an asymmetric relationship that arises between the *upstream and downstream* countries. The riparian position on the flow of the trans-boundary successive river determines the negotiating position and the bargaining strength of the country.

In the history of trans-boundary water management several *legal doctrines* were developed, that propose different ways how the rights and responsibilities at a shared river could be looked upon. There are two main extreme interpretation frameworks that limit the scope of axis of potential solutions. Those doctrines are: Absolute Territorial Sovereignty (Harmon doctrine) and Absolute Territorial Integrity (riparian rights theory[20]).

According to the absolute territorial sovereignty doctrine, a state may adopt any measures in regards to watercourses situated within its territory that would mostly suit its own national interests, not having to consider the consequences beyond its national borders. This doctrine clearly favours the upstream riparian states. On the other hand, there is the absolute territorial integrity doctrine, which claims, that downstream states have the right to receive a continued, uninterrupted (or natural) flow of the watercourse that flows through their territory, without specifying the particular duties that should accompany those rights.[21] In practice, a limited version of either of those doctrines is

[19] Toset and Gledisch set the criteria that in order to classify a river as one of the mixed type, the river has to run along the boundary of the dyad for more than 10km. In: TOSET, Hans P. W.; GLEDITSCH, Nils P.; HEGRE, Håvard. **Shared rivers and interstate conflict**. International Peace Research Institute Oslo. Political Geography 19, 2000, p. 971-996, WWW: http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VG2-41JM97W-3&_user=1490772&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000053052&_version=1&_urlVersion=0&_userid=1490772&md5=8ca156187c83f85146f2d8cbfad7626c

[20] First important study that reviewed about 100 treaties and applied the doctrine of riparian rights was the work by Prof. H. A. Smith **The Economic Use of International Rivers** (1931). He concludes that lower riparian states are entitled to share a natural flow of the river.

[21] ALLOUCHE, Jeremy. **Water Nationalism: An Explanation of the Past and Present Conflicts in Central Asia, the Middle East and the Indian Subcontinent?** Unversité de Genève, Institut

implemented, that takes account of interests of both upstream and downstream riparian states.

Today there are 3 core principles of international law that are imbedded in most contemporary bi- and multi-lateral treaties and agreements on trans-boundary water management. Those principles are:

1. Principle of *Equitable utilization,*
2. Obligation to cause *No significant harm* and the
3. Duty to *Cooperate.*

Let us now explore those principles one by one in detail as they are portrayed in the Convention on the Law of the Non-navigational Uses of International Watercourses[22] (UN WCC) of 1997.

Article 5 of UN WCC states that: "Watercourse States shall in their respective territories utilize an international watercourse in an equitable and reasonable manner...with a view to attaining optimal and sustainable utilization and thereof and benefits therefrom, taking into account the interests of the watercourse States concerned, consistent with adequate protection of the watercourse." Optimal use is not equivalent to maximum use, but rather it implies achieving the greatest possible satisfaction for each riparian state, while minimizing the detriment to or unmet needs of, each.[23] Article 6 lists in a non-weighted and non-comprehensive manner the natural and physical factors that are relevant to equitable and reasonable utilization, those being:

1. Natural factors (a) geographic, hydrographic, hydrological, climatic, ecological

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Universitaire de Hautes Études Internationales, Thèse 2005, p. 404, WWW: http://www.unige.ch/cyberdocuments/theses2005/AlloucheJ/these.pdf

[22] **Convention on the Law of the Non-navigational Uses of International Watercourses**. General Assembly, United Nations, 21 May 1997. WWW: http://untreaty.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf

[23] MECHLEM, Kerstin. **Water as a Vehicle for Inter-State Cooperation: A Legal Perspective.** FAO Development Law Service, FAO Legal Papers Online, N.32, Aug 2003, p. 19, WWW: http://www.fao.org/legal/prs-ol/lpo32.pdf

2. Physical factors (b) social and economic needs, (c) dependent population, (d) effects of use, (e) existing potential uses, (f) conservation, protection, development and economy of use and costs of those measure, (g) availability of alternatives to particular use).

In particular cases, such as in work of joint river bodies, the equitable utilization can be implemented as equitable apportionment, allocation of water resources (e.g through schemes), or by the equitable benefit sharing, analysed in the previous section.

The obligation not to cause a significant harm (*sic utero tuo ut alienum non laedas)*[24] is anchored in Article 7 of UN WCC, verbatim: "Watercourse States shall, in utilizing an international watercourse in their territories, take the appropriate measures to prevent the causing of significant harm to other watercourse states" and "where significant harm is nevertheless caused...the State whose use causes such harm shall...take all appropriate measures...to eliminate or mitigate such harm and, where appropriate, ...question of compensation shall be discussed". The legal discourse concerning the "no harm principle" attempts to interpret the definitional nuances of the term "significant", explores the effective compensation mechanisms and examines the relationship of the "no-harm" and "equitable utilization" principles. Namely, whether the former can exist without the latter and which of the two principles takes precedence, when they come into conflict. In general, the downstream riparian states prefer to address to the no harm principle, whereas the upstream states favour giving primacy to the equitable utilization principle.

The third core principle of international water law is the duty to cooperate. The Articles of UN WCC of 1997 phrases it in the following way: "Watercourse States shall cooperate on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection of international watercourses...they may consider the establishment of joint mechanisms or commissions" Following the general obligation, the principle is further developed and specified in the procedural duty to regularly exchange data and information (Article 9), and in the obligation of notification, consultation and negotiation concerning planned

[24] (lat.) Sic utero tuo ut alienum non laedas - So use your own as not to harm that of another

measures (Part III, Articles 11-19). Exchange of data does not cause an overburden to the riparian states, because it concerns data that are readily available and easily accessible, particularly of "hydrological, meteorological, hydrogeological and ecological nature". This principle is in the mandate of many inter-state commissions. Provisions on "Planned measures" concern duties arising in connection with new projects or programs or changes in existing uses of an international watercourse that can mitigate potential conflicts at an early stage.

The UN WCC of 1997 was used here to illustrate the core international law principles, but some of these have been developed long before. Already in 1956 the International Law Association (ILA) published the so-called Dubrovnik Rules for planning and management of trans-boundary rivers. More famous became the *Helsinki Rules*[25] for trans-boundary watercourses published by the same organization in 1966. Some problems arose, with the attempt to reformulate the Helsinki rules into a UN General Assembly resolution, and those were: first, that ILA was a professional organization, which did not represent nation states and second, that the Rules were based on a drainage basin approach, which could, ostensibly, be a potential problem in terms of national sovereignty considerations. The second concern was indeed manifested in the voting of several relevant countries. In 1974 the International Law Commission (ILC)[26] was assigned "to take up the study of the law of the non-navigable uses of international watercourses with a view to progressive development and codification".[27] The ILC started the research by sending out a questionnaire to all member countries of General Assembly, but the number of UN members that bothered to reply was minimal. Considerable discussions were taking place from the first draft of the resolution on non-navigational uses of international watercourses, till the approval in 1997.

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[25] **The Helsinki Rules on the Uses of the Waters of International Rivers**. International Law Association, Helsinki, August 1966, WWW: http://webworld.unesco.org/water/wwap/pccp/cd/pdf/educational_tools/course_modules/reference_documents/internationalregionconventions/helsinkirules.pdf

[26] **International Law Commission** http://www.un.org/law/ilc/ (See the Analytical guide for Law of Non-Navigational Uses and International Watercourses http://untreaty.un.org/ilc/guide/8_3.htm, http://daccessdds.un.org/doc/RESOLUTION/GEN/NR0/349/34/IMG/NR034934.pdf?OpenElement)

[27] Based on the Online Lecture by Profesor Stephen C. McCaffrey, McGeorge School of Law. **International Watercourses**. http://untreaty.un.org/cod/avl/ls/McCaffrey_IW.html

Professor Asit K. Biswas analyzes the voting patterns of individual UN member countries on this resolution, in terms of existing disputes on various trans-boundary basins. For example:

Euphrates-Tigris:	Syria in favour, Turkey against, and Iraq not involved;
Ganges:	Bangladesh and Nepal in favour, but India abstained;
Jordan:	Jordan in favour but Israel abstained;
Mekong:	Cambodia, Laos PDR, Thailand and Vietnam in favour, but China against; [28]

Biswas concludes that even if and when this Convention is ratified, there would be parties to specific conflicts who are unlikely to be signatories. But for now, even meeting the ratification, does not seem realistic in close future. From the 106 countries that voted for UN WCC, only 16 UN members have ratified it thus far[29]. Whenever 35 countries ratify the Convention, it will enter into force on the 90th day and become an international legal instrument.

In 2004 ILA approved the *Berlin Rules*[30] that updated the progressive evolution of a legal regime for managing trans-boundary waters, replacing the Helsinki Rules adopted in 1966. The Berlin Rules are a coherent summary of relevant customary international law and some authors believe a "new paradigm"[31], because addressing issues of ecological integrity, sustainability, public participation and minimization of environmental harm, that have gained acceptance in customary international law over the last 30 years without being fully articulated before.

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[28] Ed. VARIS, O; TORTAJADA, C; BISWAS, A. K. **Management of Transboundary Rivers and Lakes. Water Resources Development and Management**. Berlin: Springer, 2008, 304s.
Or WWW: BISWAS, Asit K. **Management of Transboundary Waters: An Overview**. http://www.thirdworldcentre.org/akbtransboundarywaters.pdf

[29] UN WCC was lately ratified by Uzbekistan and Germany in 2007

[30] **The Berlin Rules on Water Resources.** Law. International Law Association. 2004, http://www.cawater-info.net/library/eng/l/berlin_rules.pdf

[31] DELLAPENNA, Joseph W. **The Berlin Rules on Water Resources: The New Paradigma for International Water Law**. http://wwc2008.msem.univ-montp2.fr/resource/authors/abs568_article.doc

Let´s now broaden the scope of our inquiry and compare the relationship between the core international water law principles and *Islamic law*. Researchers have suggested that the UN WCC of 1997 is in full harmony with Islam, as it is based on universal values. Main elements that overlap are reasonable shares, equity, public interest, consulting and preserving the ecosystem.[32] Some questions that still need perhaps more research are the wastewater reuse and fair water pricing.

Other water-related *international legal instruments*[33] that are relevant for the Central Asian region are: Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Water Convention); EU Water Framework Directive (WFD) and EU Water Initiative (EUWI) that will be looked upon in more details later on.

Coming back to the initial effort to find a comprehensive setting, that could explain the formation of international water regimes, including international treaties as well as water commissions, we find it useful to apply the unified research framework of Stefan Lindemann[34]. The author combines four arguments, namely: *Power, Interest, Knowledge and Context*, to explain the formation of cooperative arrangements on trans-boundary rivers.

Lindemann basis the drivers of water-regime formation on the theory of international regimes, that was developed by Stefan Krasner. According to his definition, "international regimes are sets of implicit or explicit principles, norms, rules and decision-making procedures around which actor´s expectations converge in a given

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[32] HUSSEIN, Iyad; AL-JAYYOUSI, Odeh. **Management of Shared Waters: A Comparison of International and Islamic law**. In: Ed. FARUQUI, Naser I.; BISWAS, Asit K.; BINO, Murad J. **Water Management in Islam**. Tokyo: United Nations University Press/ International Development Research Centre, 2001, p. 170, WWW: http://www.idrc.ca/openebooks/924-0/

[33] **International Water Law Project**: http://www.internationalwaterlaw.org/

[34] LINDEMANN, Stefan. **Understanding Water Regime Formation – A Research Framework with Lessons from Europe**. Project MUSE. Global Environmental Politics, Nov 2008, Vol. 8, No. 4, Massachusetts Institute of Technology, 2008. p. 117-140, WWW: http://www.mitpressjournals.org/doi/abs/10.1162/glep.2008.8.4.117?journalCode=glep

area of international relations"[35]. Replacing the "area of international relations" in the definition with "management of trans-boundary rivers", we have a solid departing point for the explanatory framework.

The Power-based argument stems from the Realist and Neorealist schools of international relations. In the teachings of Realism, prospects of inter-state cooperation are bleak, unilateralism prevails and this is valid even more so in upstream/downstream asymmetries. Elaboration of basin-wide arrangements that would establish mutually beneficial cooperative regimes is unrealistic, however not entirely impossible. This is due to the Theory of hegemonic stability, that suggests:

Power Hypothesis (PH): Formation of international water-regimes is more likely in the presence of a downstream hegemon.

This idea is supported in one of the classical writings by Miriam Lowi[36], when she claims, that if the dominant power in the basin will benefit from regional cooperation in water utilization, it will take the lead in creating and maintaining a regime, and will enforce compliance with its rules. A downstream hegemon has an interest to secure water supply and compensate the geographical disadvantage. As power is an overreaching element on trans-boundary watercourses, it will be dealt with in greater details later on.

Let us now proceed forward to the Interest-based argument, which considers the constellations of interests between riparian states in different situation structures. Those situations can be either collective (e.g. anti-floods measures) or related to externality problems (positive or negative).

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[35] KRASNER, Stefan D. **International Regimes**. Ithaca, NY: Cornell University Press. 1983, p. 388, WWW:http://books.google.sk/books?id=WIYKBNM5zagC&dq=Krasner+international+regimes)&pg=PP1&ots=ptuwpIC2if&source=bn&sig=ik75wPONmOmDOHE32QUEFO5ili8&hl=sk&sa=X&oi=book_result&resnum=4&ct=result [15.5.2008]

[36] LOWI, Miriam R. **Water and Power. The Politics of a Scarce Resource in the Jordan River Basin.** Cambridge: Cambridge University Press, 1993, p. 292

Interest Hypothesis (IH): Formation of international water-regime is more likely with symmetric collective problems, than with asymmetric trans-boundary externalities. Formation of international water-regime is more likely with positive than negative externalities, as they do not necessarily include the contested property rights and enforcement mechanisms.

Beyond purely functional logic, bargaining tools in trans-boundary negotiations can be employed that would balance the asymmetric interests through direct or indirect cost incentives and minimize the information costs.

Knowledge-based argument underlines the importance of an existing epistemic community (network of professionals and experts) and the global scientific convergence, innovation and diffusion through trans-national channels of information. Some authors differentiate here between the horizontal arena, where state and non-state actors meet to exchange information and to coordinate their policies i.e. World Water Week in Stockholm[37] or vertical arena where international organizations as actors foster international diffusion of best practices i.e. World Water Council[38] or Global Water Partnership[39]. This cognitive network also exists in the virtual online space of various forums such as the UNDP initiated inter-active water knowledge "map" WaterWiki[40], where water practitioners worldwide discuss water-related development in international context. Generally, knowledge is highly relevant in reduction of uncertainties and all such initiatives create a cooperative environment and therefore we argue, that:

Knowledge Hypothesis (KH): Water regime formation is more likely in the presence of an epistemic community.

[37] **World Water Week** in Stockholm http://www.worldwaterweek.org/

[38] **World Water Council** http://www.worldwatercouncil.org/ that is every 3 years responsible for organizing the **World Water Forum** http://www.worldwaterforum5.org/

[39] **Global Water Partnership** http://www.gwpforum.org/servlet/PSP

[40] **WaterWiki** http://waterwiki.net/index.php/Welcome

Context-based argument is often left out in the analysis of water-regime formation and this is probably due to the difficulty to systemize the contextual factors, such as political relationship between riparian states.

Context Hypothesis (CH): Water regime formation is more likely where a high level of regional integration exists.

A careful verification of the Lindemann[41] inspired four hypothesis of drivers of water-regime formation can be made, when theoretical approaches are examined in the light of Central Asian case studies, as will be done later. Cooperation is a complex and contradictory phenomena that usually does not have only one explanation.

The next question that we need to address is: When can the formed international legal water-regime be considered a success and when on the other hand a failure? Is the number of signed treaties or the ability of water-regime to furnish targeted benefits decisive? What criteria and methodology should be used to assess success on international water-regimes?

In his landmark book, Le Marquand [42] was probably the first to outline when and why cooperation succeeds/fails and his five principal conclusions are plausible even today: (1) *Common perception of problems* creates win-win solutions in cooperation, (2) *Non-economic factors* are more crucial to cooperation than economic logic, (3) Cooperation is more successful when *social concerns* are considered in planning, (4) Cooperation is more successful when agreements are *flexible* to adapt to changes, (5) *Reciprocal interests* are conductive in problem-solving.

The methods of assessing success in terms of outcome of regime formation are various. Economists measure success mainly in terms of Pareto-efficiency (extent to which a given policy approximates the point at which no riparian country could be made better off without making another worse off). Political scientists, claiming the Pareto-efficiency being hard to empirically apply, prefer behavioural methods, that examine the

[41] LINDEMANN (2008), p. 117-127

[42] LeMARQUAND, David G. **International Rivers.: The Politics of Cooperation**, Vancouver: University of British Columbia, Westwater Research Centre, 1977, p. 143

degree to which existence and operation of an agreement changes the behaviour of key players. Legal scholars concentrate on compliance with international treaties while other social scientist criticize that this approach does not capture the whole extent of problem solving. Problem solving is considered to be a vague concept, that makes comparisons and generalizations difficult, however has the advantage of connecting research to policy-makers.[43]

Bernauer proposes that success and failure of water regime formation can be measured by the degree of goal-attainment, in a reliable and meaningful way by (1) Clearly delineating the problem; (2) Choosing a starting point in time; (3) Measuring whether and to what extent the problem has increased/decreased over time, how far the outcome has moved towards what is considered desirable, and what the outcome would have looked like without policy intervention. This is how seemingly un-measurable factors can be quantified and evaluated.

Regime features in trans-boundary river management can also be analysed from the view, whether and how they support *adaptive management*[44], which has been proposed as a way of handling uncertainties and change arising from the complexities of differences in legal frameworks, historical and cultural backgrounds, and technical capacities among the riparian states. [45] Adaptive management is a cyclical process of active learning, involving integrated assessment of current problems and possible solutions as perceived by different stakeholders, setting goals, formulation of polices that are hypothesized to contribute to reaching goals, implementation, to test the hypothesis, through systematic monitoring and evaluation of policy outcomes, including surprises.

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[43] BERNAUER, Thomas. **Explaining Success and Failure in International River Management.** Water Policy Article, Aquatic Sciences – Research Across Boundaries, Vol. 64, № 1/ April, 2002, Basel: Birkhäuser, p. 19 WWW: http://www.springerlink.com/content/u3e4puyww064a61c/fulltext.pdf

[44] RAADGEVER, Tom, G; MOSTERT, Erik; KRANZ, Nicole, et.al. **Assessing Management Regimes in Transboundary River Basins: Do They Support Adaptive Management?** Delft: The Resilience Alliance, Ecology and Society, Vol. 13, № 1, Art.14, 2008, p. 21, WWW: http://www.ecologyandsociety.org/vol13/iss1/art14/

[45] PAHL-WORSTL, Claudia; KABAT, Pavel; MÖLTGEN, Jörn. **Adaptive and Integrated Water Management: Coping with Complexity and Uncertainty.** Berlin: Springer-Verlag, 2008, p. 440

Drawing the pieces of knowledge about legal trans-boundary water regimes together we gain a series of policy recommendations. Practical policy advice to encourage cooperative arrangements can be summed up as follows: (1) Mobilize national governments; (2) Alleviate equity and fairness concern; (3) Employ political symbols and prestige; (4) Develop alternative and adaptive solutions; (5) Involve all stakeholders; (6) Pursue functional strategies; (7) Balance flexibility and stability; (8) Internalize externalities.[46]

1. 1. 3 Integrated Water Resource Management

Integrated Water Resource Management (IWRM) is currently the widely accepted approach to water management. Among the water researchers and professionals it is perhaps the most frequently used abbreviation today. What does it actually mean?

As for the interpretation, the Global Water Partnership (GWP) which has been established with the intention to foster IWRM defines the concept as follows: "*A process which promotes the coordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital eco-systems.*"[47]

Central pillars of IWRM are principles of (1) *demand management*, (2) *basin-wide planning* (3) *inter-sectoral approach including environmental considerations* (4) *subsidiarity and stakeholder participation*. This approach promotes more coordinated development and management of land and water; surface and groundwater; the river basin and its adjacent coastal and marine environment, and upstream/downstream interests.

[46] BERNAUER (2002), p. 13-16

[47] GWP (Global Water Partnership). **Integrated Water Resource Management**. TAC Background Papers No.4. Stockholm, 2000, 71 p, WWW: http://www.gwpforum.org/gwp/library/tacno4.pdf [11.7.2008]

The main rationale behind IWRM is that water has multiple uses and forms. When governed, it needs to be considered holistically, coordinating different sectors and scales. Thereby, IWRM challenges the "business as usual" approaches of fractional and conventional practices (exclusively top-down, supply led, technically based and sector approaches) and provides guidelines for an open-ended dynamic process of change.[48]

IWRM ToolBox[49] operates as a free database for sharing knowledge and experience that provides water management professionals (planners and policymakers) with clear examples of good practices of implementing IWRM. Besides the rich array of case-studies, there are altogether 54 tools available that can be combined according to suit the particular needs of a basin or locality. The tools are divided into 3 main categories and then further subdivided and explained: (1) *Enabling Environment* (policies, legislative framework, financing and incentive structures); (2) *Institutional Roles* (creating an organizational framework, building institutional capacity), (3) *Management Instruments* (water resource assessment, plans for IWRM, efficiency in water use, social change instruments, conflict resolution, regulatory instruments, economic instruments)[50]

The *development of the IWRM concept* is a result of a long evolutionary process and some elements were already abundantly represented in scientific debates decades ago.[51] Let´s now explore the global water debate that resulted in the formulation of IWRM. The process will be viewed upon critically, using mainly the argumentation

[48] GWP (Global Water Partnership). **Catalyzing Change**. A handbook for developing integrated water resources management and water efficiency strategies. Technical Committee, Norway´s MFA, 2004, 54 p, WWW: http://www.gwpforum.org/gwp/library/Catalyzing_change-final.pdf;m; GWP (Global Water Partnership). **Strategy 2009-2013**. Scriptoria: Stockholm, 2008, 24p. http://www.gwpforum.org/gwp/library/GWP_Strategy_2009-2013_final.pdf

[49] **IWRM ToolBox** http://www.gwptoolbox.org/

[50] **ToolBox textbook** http://www.gwptoolbox.org/images/stories/Docs/toolboxeng.pdf

[51] MUKHTAROV, Farkhad G. **Integrated Water Resources Management from a Policy Transfer Perspective**. Policy Paper. 15 p. WWW: http://waterwiki.net/images/1/1c/IWRM_from_a_policy_transfer_perspective.pdf; Deals with intellectual history of the IWRM koncept

used by Asit K. Biswass in the book "Impacts of Megaconferences on the Water Sector"[52].

A major milestone was the *United Nations Conference on Water - Mar del Plata, 1977* held at a high political inter-governmental level to assess the status of water resources. The Action Plan[53] adopted here can be viewed upon as the first internationally coordinated approach to IWRM. It contained recommendations and 12 resolutions on a variety of issues.[54]

Next significant conference was 15 years later and served as a preparatory event to Rio United Nations Conference on Environment and Development - namely the *International Conference on Water and Environment – Dublin 1992*. Dublin was organized like a meeting of experts, which is rather peculiar, since UN mega-conferences, such as Rio, only consider recommendations from intergovernmental meetings. The famous 4 Dublin Principles[55] were adopted here and became consolidated in Chapter 18 of Agenda 21[56] in Rio de Janeiro 1992 :

(1) Fresh water is a *finite and vulnerable resource*, essential to sustain life, development and environment. (holistic approach, hydrological cycle, ecosystem – natural limits, downstream/upstream interests)

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[52] Ed. BISWAS, Asit K.; TORTAJADA, Cecilia. **Impacts of Megaconferences on the Water Sector**. Berlin: Springer-Verlag, 2009, 276 p

[53] **Mar del Plata Action Plan**: (1) Recommendations (Essential components of water management): assessment, use and efficiency; environment, health and pollution control; policy, planning and management; natural hazards; public information, education, training and research; and regional and international cooperation; (2) 12 Resolutions

[54] One of the main assets of Mar del Plata is that many developing countries produced the first detailed national reports on water resources and national plans. Documentation produced is still available. Another achievement is, that cooperation on water between different UN agencies was achieved. Areas that deserved more attention were the financial arrangements, practical steps towards implementation of the Action Plan and area of shared trans-boundary water resources.

[55] **The Dublin Statement on Water and Sustainable Development.** International Conference on Water and the Environment, 31 January 1992, WWW: http://www.un-documents.net/h2o-dub.htm

[56] **Agenda 21: Chapter 18**. Protection of the Quality and Supply of Freshwater Resources: Application of Integrated Approaches to the Development, Management and Use of Water Resources, WWW: http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21chapter18.htm

(2) Water development and management should be based on a *participatory approach*, involving users, planners and policy-makers at all levels. (policy makers and general public, subsidiarity)
(3) *Women* play a central part in provision, management and safeguarding of water (gender, empowerment decision-making)
(4) Water has an *economic value* in all its competing uses and should be recognized as an economic good. (achieve efficient and equitable use, encourage protection, supply cost, opportunity cost, economic externalities, environmental externalities)[57]

The mostly debated principle is the fourth one on water as an economic good. In Mar del Plata Action Plan this notion was phrased in a more nuanced way: "to adopt appropriate pricing policies with a view to encouraging efficient water use, and finance operation cost with to social objective". Emphasizing the exclusivity of water as an economic good is a step back and causes much more controversies by ignoring the social aspect of water. The debates on water as an economic good or human right still resonate lively today.[58]

Even today some state representatives (e.g. from Kyrgyzstan) still like making references to Dublin Principles, when they advocate the need to receive payments for water that is provided to downstream states. Some water professionals when explaining the IWRM concept use as their point of departure the Dublin Principles and interpret them in such a way, as if they encompassed all the different aspects of the IWRM concept where it stands today.

On the other hand we have the critics such as Biswas that argue, that Dublin comparing to Mar del Plata is a retrogressive step. As it took place only 4 months before Rio, and had the form of a meeting of experts, it had only a marginal practical effect. Agenda 21 would most likely look the same without Dublin materializing. Dublin Principles are just simple bland statements, which even if implemented by miracle,

[57] Explanations in brackets give possible contemporary interpretation of the Dublin Statements considering the IWRM concept.

[58] FRANZKE, Jochen (Ed.) **Wasser. Zukunftressource zwischen Menschenrecht und Wirtschaftsgut, Konflikte und Kooperation.** Internationale Probleme und Perspektiven 17. Brandenburgerusche Landzentrale für politische Bildung. Potsdam: Impressum, 2008, 162 p.

would not necessarily create conditions for efficient water management. They make no reference to poverty alleviation, regional economic distribution or environmental conservation and ignore issues of water governance.[59]

World Water Forums were initiated as a new open, all-inclusive and multi-stakeholder platform for global water challenges, with the aim to raise the importance of water on the political agenda. The Forums are organized every 3 years by the international policy think-tank World Water Council (WWC) and the host country. The initial idea was to establish an analogue of World Economic Forums of Davos for the water professionals. This was objectively impossible because of the (1) lack of finances; (2) absence of good, long-term planning capacity; (3) inability to bring together the "movers and shakers" of the water sector and lastly, (4) because the WWC members had different views on agenda; political infighting and personal interests caused that the decisions reached were seldom optimal, often reached with trade-offs and reduced to lowest common denominator to be acceptable to the Council as a whole.[60]

The *1st World Water Forum* was held in Marrakesh, Morocco, in March 1997 and was mandated to develop a long-term "Vision on Water, Life and the Environment for the 21st Century. This Forum can be characterised as continuous speech-making with no time for discussions or consultations. A progress in this regard is the *2nd World Water Forum* organized in Hague, Netherlands three years later with the theme "From Vision to Action". Here, besides the speeches also active discussions within the frame of 100 sessions on a variety of topics took place. Also the participation increased rapidly from hundreds to as much as 4600-5700 participants. The outcome of the Forum was a Ministerial Declaration[61] that identified key challenges for the future and

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[59] BISWAS Asit K. **Impact of Megaconferences on Global Water Development and Management.** http://www.springerlink.com/content/h351283j67885850/fulltext.pdf In: Ed. BISWAS, Asit K.; TORTAJADA, Cecilia. Impacts of Megaconferences on the Water Sector. Berlin: Springer-Verlag, 2009, 276 p.

[60] BISWAS (2009), p. 3-22; 145-159

[61] **First World Water Forum. The Declaration of Marrakech.** http://www.worldwatercouncil.org/fileadmin/wwc/Library/Official_Declarations/Marrakech_Declaration.pdf, **Ministerial Declaration of The Hague on Water Security in the 21st Century.** http://www.worldwatercouncil.org/fileadmin/wwc/Library/Official_Declarations/The_Hague_Declaration.pdf

suggested institutional, technological and financial innovations, transparent governance, cooperation with international organizations and UN agencies[62]. Ministers agreed to provide support to the UN system for periodic reassessment of the state of freshwater resources.[63] Credit needs to be given to the Dutch government for assuring not only official representation, but also space for civil society.

Chronologically, the great *UN Millennium Summit* held at UN headquarters in New York in 2000, need to be mentioned at this point, as another major event that influenced the global water debate. The Millennium Declaration adopted here inspired the 8 Millennium Development Goals (MDGs)[64] with 18 targets set, of which many are in/directly influenced by the world´s state of freshwater resources, including the target "to halve the proportion of people without access to safe drinking water by 2015".

Similarly as before in the case of Dublin being a preparation for Rio, the *International Conference on Freshwater* took place *in Bonn*, Germany, in December 2001, as preparation for the *World Summit on Sustainable Development in Johannesburg* (WSSD), South Africa, in Aug/Sept 2002. The Bonn Keys[65] adopted here are steps toward sustainable development through meeting water security needs for the poor, decentralization and strengthened governance and IWRM. Paraphrasing Biswas, some of the Bonn discussions were grossly out of date, Bonn Statement has been heard repeatedly during the previous 2 decades and the Bonn Keys disappeared from the collective memory of water professionals within less than a year and the Ministerial Declaration[66] was equally vague. Nevertheless one has to admit that significantly more water professionals participated in Johannesburg comparing to Rio. The Summit reiterated MDGs and added one in the area of sanitation – "to halve the

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[62] RAHAMAN, Muhammad M; VARIS, Olli. **Integrated Water Resource Management**: Evolution, prospects and future challenges. Sustainability: Science, Practice, &Policy, Volume 1, Issue 1, Spring 2005, http://ejournal.nbii.org/archives/vol1iss1/0407-03.print.html

[63] **World Water Forum Bulletin**. A Summary Report of the 5th World Water Forum. A Brief History of Global Water Issues. IISD Reporting Services. http://www.iisd.ca/download/pdf/sd/ymbvol82num23e.pdf

[64] **Millennium Development Goals**: http://www.un.org/millenniumgoals/

[65] **The Bonn Keys**: http://www.water-2001.de/outcome/BonnKeys/Bonn_Keys.pdf

[66] **Bonn Ministerial Declaration**: http://www.water-2001.de/outcome/MinistersDeclaration/Ministerial_Declaration.pdf

number of people lacking adequate sanitation by 2015". An important outcome document that stem from the Summit was the Johannesburg Plan of Implementation[67] that included in Article 25 the commitment "to develop IWRM and water efficiency plans by 2005".

In 2003 the *3rd World Water Forum* was held in Japan, simultaneously in 3 cities Kyoto, Osaka and Shiga. The fragmentation of the location resulted in the fact, that nobody had a clear overview of what was happening, in terms of what the main messages or outcomes were. Comparing to Hague, the number of participants was four times as high (up to 24 000 people) and the number of conducted sessions was above 300, all being independent without a binding thread or topic. The Ministerial Declaration[68] called "Message from the Lake Biwa and Yodo River Basin"[69] underscored the role of water as a driving force to sustainable development. A special statement dealing with IWRM and basin management was published. Second outcome of the Forum was the launching of the Portfolio of Water Actions -- Time to Act, which is an inventory of more than 3000 local actions[70]. Perhaps the biggest achievement of the Japanese organizers was that the Forum was truly all-inclusive, involving first time in history stakeholders and water minister from the whole world, which enabled wide information sharing. However, today the number of people and countries that participate should no longer be the relevant indicator of success. When we explore the cost-effectiveness of this mega-conference, some say that the Forum, which was an extraordinarily expensive event had only a marginal impact on water sector and it was nothing more that a "large water fair".

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[67] **Johannesburg Plan of Implementation:** http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf

[68] **Final Report.** Ministerial Conference on the Occasion of the 3rd World Water Forum http://www.mlit.go.jp/tochimizushigen/mizsei/wwf3/FinalReport-Web.pdf

[69] Biswas complains, that the Declaration was based on a draft made by the Japanese Ministry of Foreign Affairs and was never adequately consulted with other representatives and as for the implementation, the ministers did not take the Declaration seriously.

[70] E.g. from Central Asia it was only Kazakhstan: Ecological Security of Kazakhstan Sector of the Caspian Sea; Drinking Water Provision for Population

At the Japanese World Water Forum the 1st edition of *UN World Water Development Report (WWDR)*: "Water for People, Water for Life"[71] was presented. The WWDR is a periodic, comprehensive review that gives an authoritative picture of the world´s freshwater resources aiming to provide decision-makers with tools for sustainable use of water. The Report is a collaboration of 23 UN agencies and contains a chapter relevant chapter about trans-boundary watercourses called Shared waters[72]. The WWDR are an excellent example of how newest scientific findings are disseminated among policy and strategy-makers, professionals and public.

Starting from 2005, the UN organizes the International Decade for Action "Water for Life"[73] that focuses on the implementation of water-related programmes and projects and on strengthening cooperation. This idea was inspired by the speech of Emomali Rahmonov (today Rahmon), President of the Republic of Tajikistan (at that time President of the International Fund for Saving the Aral Sea (IFAS)), at the 3rd World Water Forum, who proposed to announce "Decade of Fresh Water" beginning year 2005.

Next *World Water Forum, 4th* in the order took place in Mexico City, Mexico, 2006. Quantitative-success indicators countdown of the mega-conference was as follows: 20 000 participants, 206 working sessions and 1600 "Local actions for global challenge", which in fact was the binding idea behind the Forum. The main outcomes of the thematic component (framework themes and cross-cutting themes) can be downloaded freely online, as well as the specific regional documents[74]. The political process was brought beyond ministerial and also a role of parliamentarians and local governance was recognized. Besides the Ministerial Declaration, which linked water

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[71] **UN/WWAP** (United Nations/World Water Assessment Programme). **1st UN World Water Development Report: Water for People, Water for Life**. Paris, New York and Oxford: UNESCO (United Nations Educational, Scientific and Cultural Organization) and Berghahn Books, 2003, 544 p. **Executive Summary**: http://unesdoc.unesco.org/images/0012/001295/129556e.pdf

[72] **Challenge 8: Sharing Water: Defining a Common Interest** (UNESCO) http://www.unesco.org/water/wwap/wwdr/wwdr1/pdf/chap12.pdf

[73] **Water for Life** http://www.un.org/waterforlifedecade/

[74] E.g. **Asia-Pacific Regional Process** (With documents from sub-regions, including Central Asia): http://www.worldwatercouncil.org/fileadmin/wwc/World_Water_Forum/WWF4/Regional_process/ASIA-PACIFIC.pdf

and sanitation to sustainable development and poverty reduction strategies, a complementary Ministerial Declaration by Bolivia, Cuba, Uruguay, Venezuela was adopted.[75] Virtual water forum was introduced as a platform for different stakeholders to communicate online to arrange sessions and exchange knowledge.

The 2nd *United Nations World Water Development Report: "Water, a Shared Responsibility"*[76] was launched as a joint undertaking of UN-Water partnership uniting presently 26 UN agencies, governments and stakeholders, coordinated by World Water Assessment Programme. Recently, also the third edition of this UN WWDR was published, named "*Water in a Changing World*"[77] with the central theme: Getting out of the water box into the sphere of decision-making about water. The Report is accompanied by a case study volume. It was presented on the *5th World Water Forum*[78] that took place in Istanbul, 16th – 22nd March 2009 with a topic Bridging Divides. This was the world's ever biggest water-related event with 33 058 participants. Currently, a review of this event is being conducted.

We have summarized the most relevant events and publications that shape the global debates on water management practices, including implementation of IWRM. Now there is the time to give some feedback on the concept itself, whether and it is being implemented, how it needs to be reconsidered and what is the critics raised against the concept of IWRM.

Water management is closely interlinked with culture. The concept of IWRM offers a framework into which various cultural specificities can be fitted to suit best the national or regional water management practices. The question remaining is, is IWRM universal enough? For example, must participation and watershed orientation always be

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[75] **4th World Water Forum, Final Report, Local Actions for a Global Challenge**, Mexico, 262 p. http://www.worldwatercouncil.org/fileadmin/wwc/Library/Publications_and_reports/Final_Report_4th_Forum.pdf

[76] **UN/WWAP** (United Nations/World Water Assessment Programme). **2nd UN World Water Development Report: Water a Shared Responsibility**. Oxford: UNESCO, Berghahn Books, 2006, 550 p. **Executive Summary**: http://unesdoc.unesco.org/images/0014/001444/144409E.pdf

[77] **UN/WWAP** (United Nations/World Water Assessment Programme). **3rd UN World Water Development Report: Water in a Changing World**. Paris: UNESCO, 2009, 349 p. WWW: http://www.unesco.org/water/wwap/wwdr/wwdr3/pdf/WWDR3_Water_in_a_Changing_World.pdf

[78] **5th World Water Forum** http://www.worldwaterforum5.org/

the criteria for good governance? In fact, participation alone does not work, on the contrary, the participatory set-up can be high-jacked by local leaders who act in an authoritative manner, which leads to even more corruption and worse governance. It is therefore crucial, to apply the policies in the light of historical and cultural reality of a country and not building parallel structures, which causes frustration. The partner country cannot be made a playground for principles that did not even work at home, no matter how fancy they seem.[79]

The concept of IWRM has been repeatedly criticised for having an "amorphous" definition. Basic questions such as what should be integrated, by whom are unclear. Taking the GWP definition of IWRM, which is cited in the beginning of this chapter, Biswas analyzes it word by word claiming it is un-implementable in operational terms, internally inconsistent, lacking measurable criteria and the absenting clarity and reductionism, as he puts it contributes to the popularity of the concept[80]. Various authors and institutions give different opinions on what should be integrated and Biswas summarizes these and identifies a set of over 40 issues that are most frequently mentioned, e.g. (1) objectives – economic efficiency, regional income redistribution, environmental quality, social welfare, (2) water supply and demand, (3) quality and quantity, (4) water and land, (5) water uses – domestic, industrial, agricultural, navigational, recreational, environment, hydropower generation…[81]

Now let's imagine we actually integrate all the water-related sectors under one roof. This would include agriculture, energy, tourism, environment, industry… just by listing all of those complex issues we realize, that we would get an enormous, unmanageable agency, which would beyond any doubt be counterproductive. Instead methods and strategies should be worked out, how best to collaborate, cooperate and

[79] MATZ, Manfred. **Rethinking IWMR Under Cultural Considerations**. In: (Ed.) SCHEUMAN, Waltina; NEUBERT, Susanne; KIPPING, Martin. **Water Politics and Development Cooperation. Local Power Plays and Global Governance**. German Development Institute, Berlin: Springer, 2008, 416 p.

[80] BISWAS, Asit K. **Integrated Water Resource Management: A Reassessment. A Water Forum Contribution.** IWRA, Water International, Vol 29, No 2, p. 248-256, June 2004. http://www.adb.org/Documents/Books/AWDO/2007/dp05.pdf

[81] BISWAS Asit K. **Integrated Water Resources Management: Is It Working?** In: Water Resources Development, Vol. 24, No. 1, Routledge, March 2008, 5-25 p. WWW: http://www.thirdworldcentre.org/iwrmjournal.pdf

coordinate the activities of all the sectors that are linked with the interdisciplinary water issues.

The funding of IWRM has been immense. Various donor agencies have pumped unbelievable amounts of cash into the promotion of the principles. Now careful assessment needs to be made, whether actual progress is mirrored in these efforts[82], or whether the IWRM mask is used just to receive the conditioned funding. An estimate has been made, that the countries that via their bilateral agencies promote the IWRM implementation abroad have in the best cases achieved 30% at home.

1. 2 Security of Trans-boundary Waters

1. 2. 1 Environmental Security and Water Wars

Security studies have a very significant place in the research of inter-state relations. At this point, we will narrow down the scope of inquiry by focusing firstly at the relatively new subset of security studies, called the *environmental security*. Later, the environmental security concept will be applied to the specific international regime, namely the *trans-boundary river basin*. Further, questions of environmental and *water conflict, conflict transformation and environmental peace-making* will also be addressed.

Environmental security goes beyond the classical "national security" paradigm and is inspired by the "*human security*" concept. Human security, taking a shift from the state as a major actor, brings the population to the central focus arena, and explores the "interdependence of national security and individual's freedom from both immediate threats, such as violent attempts to physical integrity or other sudden hurtful disruptions in the patterns of daily life, and chronic threats such as hunger, disease and

[82] BISWAS, Asit K. **Current Directions: Integrated Water Resources Management – A Second Look**. In: Water International, International Water Resource Association, Routledge, Vol 33, No. 3, Sept 2008, 274-278 p. http://www.informaworld.com/smpp/content~content=a901698805~db=all~jumptype=rss;

repression"[83]. This discourse opened up academic and policy debates on human security and conflict prevention and on practical application of the findings. However, the critics voice, that the weak side of human security is, that it is rather analytically unfocused.

The umbrella term "environmental security" refers to freedom from environmental destruction and resource scarcity that pose major threats to human life, consisting of: 1) conflicts where the environment and natural resources play a key role, 2) environmental threats to societies and peoples' livelihoods other than related to direct violent conflict, and 3) diminishing ecological carrying capacity, e.g. issues of sustainable development.[84]

It is crucial to realise, that the environment is closely interlinked with politics, economy and socio-cultural context. The problem of many analysis and empirical applications of environmental security theory is that the meaning of environment tends to be either exaggerated or underestimated. Finding a proper balance between environment and politics is a very difficult task. If environmental issues become overly de-politicised, it is unsuitable, as then the array of multiple causes behind a conflict is not outspoken. Such undesired simplification can result in a prolongation of the conflict transformation.

The early writing on environmental security builds on the Neo-Malthusian logic of "Limits of growth"[85]. The basic hypothesis here is, that conflicts over scarce resources become more likely with global population rising. At the forefront, two research groups were involved in developing those ideas further: 1) *Toronto group*

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[83] Reference to human security is made i. e. In: UNDP. **Human Development Report, Central Asia. Bringing down barriers: Regional Cooperation for Human Development and Human Securtiy**. Regional Bureau for Europe and the Commonwealth of Independent States, Bratislava, 2005, 268 p., WWW: http://hdr.undp.org/en/reports/regionalreports/europethecis/central_asia_2005_en.pdf

[84] GLEDITSH, N. P. **Environmental Change, Security, and Conflict**. In: Ed. CHESTER, C; HAMPSON, F. O.; AALL, P. **Leashing the Dogs of War: Conflict Management in a Divided World**, United States Institute of Peace Press, Washington DC, 2007, 177- 197 p. WWW: http://hei.unige.ch/sections/sp/courses/0607/gleditsch/readings/Gleditsch-ENVIRONMENTALCHANGE-SECURITY-AND-CONFLICT.pdf

[85] MEADOWS, Donella H; MEADOWS, Dennis L, et.al. **The Limits of Growth. A report for the Club of Rome's project on the predicament of mankind**. Universe Books: New York, 1972, 205 p.

directed by Thomas Homer Dixon[86]; 2) *ENCOP* scholars associated with the Environment and Conflict Project of the Swiss Federal Institute of Technology in Zurich and the Swiss Peace Foundation in Bern. Both of the active research cliques analyze the ex-post cases of environmental scarcity and where it led to conflict.

Toronto group comes to the finding that environmental scarcity rarely contributes directly to interstate conflict. There are 3 types of conflicts that might arise, those being: simple scarcity conflict (resources vital for human survival), group identity conflict (hostilities between ethnic or cultural groups provoked by circumstances of deprivation and stress) and insurgencies in the context of relative deprivation of lower-status groups (deepening class cleavages or general social discontent). Thomas Homer-Dixon lists four social effects of such conflict: decrease in agricultural production, general economic decline, population displacements, disruptions of institutions and social relations. The criticism that can be put against this research is that the lack of a control group produces imprecise variables.

The ENCOP started as an initiative to define what an environmental conflict is[87]. "Environmental conflicts manifest themselves as political, social, economic, ethnic, religious or territorial conflicts, or conflicts over resources or national interests, or any type of conflict. They are traditional conflicts induced by an environmental degradation." Environmental conflicts are characterized by the principal importance of degradation in one or more of the following fields: 1) overuse of renewable resources; 2) overstrain of the environment's sink capacity (pollution); 3) impoverishment of the space of the living. The main focus of the research of this group lies on violent conflicts, actual and potential, low and high intensity. The actual research is two-sided, at one hand analysing actual conflicts if environmental factors are relevant for them; and also

[86] HOMER-DIXON, Thomas F. **The Myth of Global Water Wars**. Toronto Globe and Mail, 9 Nov 1995. 2 s. WWW: http://www.homerdixon.com/download/the_myth_of_global.pdf; HOMER-DIXON, Thomas F. **Environment, Scarcity and Violence**. Chichester: Princeton University Press, 2001, 271 s. http://books.google.com/books/p/princeton?id=duVvvZe2NQQC&printsec=frontcover&hl=sk&source=gbs_ViewAPI&hl=en#PPP1,M1; HOMER-DIXON, Thomas F. **Enivronmental Scarcities and Violent Conflict: Evidence from Cases**. International Security, Vol 19, No I. (Summer 1994), 5-40 p, WWW http://dlc.dlib.indiana.edu/archive/00002983/01/Environmental_Scarcities_and_Violent_Conflict.pdf

[87] LIBISZEWSKI, Stephan. **What is an Environemtal Conflict?** ENCOP Occ.Paper, Center for Security Studies, ETH Zurich, 1992, 14 p, WWW: http://cms.isn.ch/public/docs/doc_238_290_en.pdf [10.3.2006]

analysing regions with serious environmental degradation if social effects resulting from them are leading or could lead in the future to violent conflicts.[88]

Humans are both subjects and object to ecological change. Environmental change can lead to environmental crisis that can trigger a conflict both within and between nations. This is the basic assumption behind ENCOP. The group also contributed to the research by defining seven stereotypical environmental conflicts[89]: ethno/political, centre periphery, regional migration/displacement, trans-boundary migration, demographically caused, international water/river basin and arising from distant sources due to neo-colonialist exploitation. The categories of conflicts are intra-state, internationalized intra-state and international. A specific case is the national sacrifice area, where the local population bears the ecologic and economic burdens without participating at the profits. Such intra-state situation can be demographically induced and can lead to an internationalized conflict when e.g. environmental refugees start crossing national borders. The theory is exemplified in a clear table and from the region of Central Asia the case of Aral is seen as a demographically induced internationalized intra-state conflict involving Kazakhstan, Uzbekistan and Turkmenistan with a possible secession of Karakalpakstan; and Toktogul is classified as an environmental conflict between Kyrgyzstan and Uzbekistan where the up/downstream relations are sharpened by the ethnic clashes.

The *International Peace Research Institute in Oslo* (PRIO) and the heterogeneous groups of scholars led by Gleditsch[90] used quantitative models to test, validate and disprove of the conclusions of the previous research. No clear evidence was

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[88] (Ed.) SPILLMAN, Kurt; BÄCHLER, Günter. **Environmental Crisis: Regional Conflicts and ways of Cooperation.** Environmental Conflicts Project (ENCOP). International Protection on Violence and Conflicts Caused by Environmental Degradation and Peaceful Conflict Resolution. Occ.Paper 14, Sept 1995, 185 p. WWW: http://www.se2.isn.ch (provider) [10.3.2006]

[89] BÄCHLER, Günther. **The Anthropogenic Transformation of the Environment: A Source of War? Historical Background, Typology and Conclusions.** In: (Ed.) SPILLMAN, Kurt (1995) p. 11-28

[90] GLEDITSCH, N. P.; OWEN, T.; FURLONG, K.; LACINA, B. **Conflicts over Shared Rivers: Resource Wars or Fuzzy Boundaries?** PRIO, 2004, 26 p. WWW: http://www.prio.no/sptrans/-317102521/file45233_isa_proceeding_14244.pdf); TOSET, Hans P. W.; GLEDITSCH, Nils P.; HEGRE, Håvard. **Shared rivers and interstate conflict**. Political Geography 19 (2000), International Peace Research Institute Oslo, 2000, 971-996 p. WWW: .http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VG2-41JM97W-3&_user=1490772&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000053052&_version=1&_urlVersion=0&_userid=1490772&md5=8ca156187c83f85146f2d8cbfad7626c

found, that would support the hypothesis claiming that scarcity and resource overuse leads to conflicts. This branch however only examined the environmental insecurity when related to more than 25 battle deaths per year, leaving out lower levels of conflict and non conflict-related dimension of environmental security. PRIO introduced new variables, such as poverty, political regime type and cultural indicators. The economic and political variables were defined as the "missing link" between environmental degradation and armed conflict. Overall, this group failed to generate a new theoretical insight or a ground-breaking concept[91].

Critics claim, that this branch of research was not able to demonstrate how societies construct the human-environment interaction and how this relates to conflictive or cooperative behaviour. As an alternative, the social constructivists suggest *that one cannot start with the resources, but should rather focus at social groups. Such observations allow examining violence as a multi-faceted systematic phenomena rather* than a liner model of cause and effect.

Jon Barnett reacted on the early writings of environmental security[92] by systemizing the knowledge and placing it along with the other new security issues, such as energy security, economic security and food security in the context of the new security era. Within the scope of environmental security, the hypothesis of water wars plays a specific role. It was developed already in 80s and followed the logic, that the wars of the future will be fought over water. This was originally a paradigmatic shift of looking at armed conflicts in the Middle East, where the wars for water will be unavoidable in the future[93]. Barnett explains that because scarce resources can be priced they are an economical rather than environmental problem. Conflicts over water are a result of a failure of politics to negotiate the settlement over the shared use of water.

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[91] HAGMANN, Tobias. **Confronting the Concept of Environmentally Induced Conflicts.** Peace, Conflict and Development, Issue 6, Jan 2005. 22 p. WWW: http://www.peacestudiesjournal.org.uk/docs/Environmental%20conflict%20final%20version%20edited.pdf [23.11.2008]

[92] BARNETT, Jon. **The Meaning of Environmental Security. Ecological Politics and Policy in the New Security Era.** London: Zed Books, 2001

[93] COOLEY, John K. **The War over Water**. Foreign Policy 54, 1984. 3-26 p. WWW: http://www.jstor.org/pss/1148352 [18.11.2008]

The water war hypothesis was extensively challenged by Aaron Wolf, who will be also presented in the context of the Trans-boundary Freshwater Dispute Database later on. Now let's explore his arguments against the plausibility of water wars. He refutes the hypothesis of water war through empirical evidence from the history. In the past, "there has never been a single war fought over water", except perhaps the dispute between Sumerian cities of Lagash and Umma 2500 years BC. Modern history has 7 minor skirmishes over international waters[94]. Instead Wolf argues that cooperation dominates and he uses empirical proof to verify such statement. The second argument is strategic. What would be the rationale behind launching a war over water. What would be the goal? Wolf gives an example of the upstream riparian state that would decrease quality or quantity of water to antagonize the down-stream neighbour. Should the downstream aggressor as a regional hegemon attack? Attacking let's say by destroying a dam would flood the downstream aggressor. This would have to happen with complete ignorance of the international community, which is possible only in vacuum. The undesired consequence for the aggressor is that the flooded area would have to be depopulated. Again the economic explanation: All this effort for a resource that can be created from seawater at the cost of 1US dollar per cu. m.

There are two more points suggested to negate the water wars hypothesis: shared interests and institutional resiliency. These are based on the cooperation, which takes place also among the most hostile riparian states, because of the common interests of a basin: hydrological, political and cultural. The conclusion of this discourse is also partly economic. "Water is not a costly commodity, and also not a particularly scarce one, therefore water war could not cost out. War over water is not hydrographically effective, strategically rational, nor economically viable."[95]

[94] WOLF, Aaron T. **Conflict and Cooperation along International Waterways**. Water Policy Vol.1 n.2, 1998, 251-265 p. WWW: http://www.transboundarywaters.orst.edu/publications/conflict_coop/#paper [30.10.2008]

[95] WOLF (1998), 251-265 p.

Philipp Stucki involved in rethinking the nexus between water scarcity and armed conflict[96], comes to the conclusion, that true water wars are unlikely events. He doubts that a war could start over direct access to water. However, water can be politicized in conventional warfare and attacking water infrastructure can take place, but the sole condition of water scarcity is neither necessary nor sufficient for such a war to occur. Stucki systemized the argumentation made by the academic circles challenging the water war hypothesis distinguishing those specific sets of arguments: 1) questioning of supply side of the water wars argument; 2) questioning the demand side; 3) suggestions about optimal pricing of water resources; 4) showing cooperative potential in managing water resources. Let's look more closely at the first argument of expanding the water supply. The proposed strategies to increase the physical quantity of water available in a basin are:

a) Long-distance transfer (water peace pipes, super tankers or vinyl "Medusa"-bags);
b) Desalination ("high-tech" option, ultrafiltration);
c) Fossil ground-water use;
d) High dams (increase steadiness of supply and balance out seasonal variations);
e) Wastewater treatment (reuse of urban and industrial wastewaters)
f) Reducing water losses (drop irrigation, saving, reducing evaporation over artificial lakes).

Second argument for questioning the water wars hypothesis is the demand side of the issue. The demand for water is also not necessarily a fixed variable and can be adapted. With the emergence of contemporary management principles, P. Gleick speaks of the "changing water paradigm". In his words, it is the shift for primary reliance on finding new sources of supply to address perceived new demands. "The old paradigm of relying on-ever larger number of dams, reservoirs aqua-ducts to capture, store, and more even larger fractions of freshwater run-off is beginning to fail for environmental,

[96] STUCKI, Philipp. **Water Wars or Water Peace? Rethinking the Nexus between Water Scarcity and Armed Conflict**. Occasional Paper No 3/2005. Geneva: PSIS (Programme for Strategic and International Security Studies), 2005, 82 p, WWW: http://www.psis.org/pdf/PSIS-OccPap-2_2004-Stucki.pdf [27.03.2007]

economic, and social reasons." [97] New options of exploring efficiency improvements, implementing options for managing demand and reallocation of water between users need to implemented. He further stresses the importance of environmental movements and economic advantages of non-infrastructural strategies.

L. Ohlson approaches the demand-side argument through the metaphor of a "turning screw". When explaining the interaction between water scarcity and human responses, the first turn of the screw seeks to increase water availability through large scale supply projects. As soon as this becomes uneconomic or reaches physical or political water availability limits, demand-side of the management, the second "turn of the screw" comes in. The third phase is the reallocation of water towards a more profitable sector, for example a shift away from agriculture to the increased dependency on the "virtual water" import. To sum up, the turning screw represents the first order conflicts over quota allocations between different basin states and second order conflicts refer to e.g. large-scale projects, resettlement or destruction of livelihoods. Third turn attempts to reallocate water to more profitable sector.[98]

At this point, the concept of "virtual water" trade needs to be explained. This idea was developed by Tony Allan and refers to the water required for the production of commodities, such as food. To produce a kilogram of bread, approximately 1000 liters of water is needed, and about 10,000 liters is needed for the production of a kilogram of meat.[99] This is the so called "hidden water" and is more easily transportable in the form of the product, than in the liquid state. Therefore, in water-scarce regions it is economically desirable to reallocate water from water "thirsty" agriculture to other

[97] GLEICK, Peter H.: **The Changing Water Paradigm: A Look at the Twenty-first Century Water Resources Development**. International Water Resources Association. Water International, Vol.25, Number 1, March 2000, 127-138 p. , WWW: http://www.usp.br/procam/govagua/Documentos/Biblioteca/governan%C3%A7a/gleick_2000.pdf [23.11.2008]

[98] LUZI, Samuel. **International River Basins: Management and Conflict Perspectives**. CSS Environment and Conflict Transformation. 2006, 1-10 s. Also available WWW: http://www.nccr-north-south.unibe.ch/publications/Infosystem/On-line%20Dokumente/Upload/Samuel_Luzi_Cahiers_article_en[1].pdf [23.11.2008]

[99] ALLAN, J. A. **Virtual Water – the Water, Food, and Trade Nexus. Useful Concept or Misleading Metaphor?** SOAS/King´s College London, Water Research Group. IWRA, Water International, Vol 28, N 1, March 2003, 8 p.

productive sectors with higher returns per drop of water, and import food instead of domestically producing it. Instead of countries going to war for water, they can import it in the hidden form. The rationale behind this logic is that different quantities of water are used, when food is produced in different climatic zones. It is estimated, that 8% less water is used globally due to the availability of virtual waters.[100] An interesting counter-argument is the policy of food self-sufficiency that at times surpasses the economic logic. As to the examples of institutionalization of virtual water trade, the idea of the Virtual Water Trading Council (to be a part of WTO) is to set conditions that would ensure that water saved through virtual trading is used for sanitation and health measures.[101]

Back to environmental security as such. The commonly held critique is that the emphasis on security brings with it undue and counterproductive emphasis on conflictual methods, frameworks and institutions. As an alternative, the concept of *environmental peacemaking* is offered[102]. When incorporating environmental threat into security policies sceptics doubt that engaging security institutions on environmental matters will green security rather than militarize environmental policy. Conceptualizing environmental peacemaking is seen as an effective catalyst in reducing tensions, fostering demilitarization and promoting peace. As environmental cooperation promotes peace, peace is a prerequisite for environmental cooperation. [103] We cannot conclude that environmental cooperation causes peace, but certain forms of cooperation are

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[100] HORLEMANN, Lena; NEUBERT, Susanne. **Virtual Water Trade. A realistic concept for resolving the water crisis?** German Development Institute, Bonn, 2007, 139 p. WWW: http://www.waterfootprint.org/Reports/Horlemann_&_Neubert_2007.pdf

[101] MASON, Simon A.; MULLER, Adrian*:* **Linking Environment and Conflict Prevention. The Role of the United Nations.** Zurich: Center for Security Studies, 2008, 117 p. WWW: http://www.css.ethz.ch/UNstudy_Long-June-2008.pdf. Quoting: KALAUGHER, L. **Virtual-water trading council could benefit developing countries**. Sustainable Futurem, May 6, 2007, WWW: http://environmentalresearchweb.org/cws/article/futures/27271

[102] (Ed.) CONCA, Ken; DABELKO, Geoffrey D. **Environmental Peacemaking**. Washington, D. C: Woodrow Wilson Center Press, 2002, 244 p.

[103] CONCA, Ken: **The Case for Environmental Peacemaking**. In: (Ed.) CONCA, Ken; DABELKO, Geoffrey D. **Environmental Peacemaking**. Washington, D. C: Woodrow Wilson Center Press, 2002, 1-22 p.

certainly useful tools in hands of peace-makers, which can be translated into lessons of specific conflict prevention measures (CPMs)[104].

1. 2. 2. Conflict-Cooperation Nexus, Hydro-Hegemony

Many academic research teams and think-tanks are involved in studying trans-boundary water issues. A solid example of such activities is the University Partnership for Transboundary Waters[105], an international consortium uniting about 18 partners from 5 continents. Some activities related of one of the prestigious partners – the *Oregon State University* will be plotted in this chapter. Further, another water expert clique – *The London Water Research Group* will be presented. Those two examples were chosen because of the well developed methodological framework that they use.

Perhaps the best starting point for studying trans-boundary river basins with the intention to identify, what the factors that influence development of cooperation or conflict, would be the *Trans-boundary Freshwater Dispute Database* (TFDD)[106]. The TFDD was developed by the Oregon State University Department of Geosciences in collaboration with Northwest Alliance for Computational Science and Engineering and facilitates a comprehensive study of issues related to conflict or cooperation over shared water resources.

The database currently contains a digital mapping of the 263 international watersheds, along with geographic information system (GIS) mapping of many spatial parameters. The TFDD contains a subset called *International Freshwater Treaties Database* that collects 450 inter-state agreements during the period of 1820-2007. For our research purposes, possibly the most relevant section is the *International Water Events Database* that contains 6400 historical international water relations from 1948-

[104] More on CPMs 26 environmental conflict prevention measures (CPMs) In: MASON, Simon A.; MULLER, Adrian*:* **Linking Environment and Conflict Prevention. The Role of the United Nations.** Zurich: Center for Security Studies, 2008, 117 p. WWW: http://www.css.ethz.ch/UNstudy_Long-June-2008.pdf The study collected 26 CPMs underlying environmental trends and driving forces potentially escalating a conflict (structural conflict prevention) and/or aspects of conflict dynamics where th environment plays a key role (operational conflict prevention).

[105] **The University Partnership for Transboundary Waters**: http://waterpartners.geo.orst.edu/

[106] **Oregon State University. Program in Water Conflict Management and Transformation.** http://www.transboundarywaters.orst.edu/

2005 and can be searched by setting a particular basins, countries, date, issues, or rating in the BAR scale[107]. Every reported interaction is rated according to the "Water event intensity scale" [108] by Yoffe et.al, where 0 represents the "neutral or non-significant acts for the inter-nation situation" and all events can be placed somewhere between the two extremes, minus 7 the formal declaration of war and plus 7 voluntary unification into one nation.

- 7	Formal declaration of war
- 6	Extensive war act causing death, dislocation or high strategic cost
- 5	Small scale military act
- 4	Political-military hostile actions
- 3	Diplomatic-economic hostile actions
- 2	Strong verbal expression displaying hostility in interaction
- 1	Mild verbal expression displaying discord in interaction
0	Neutral or non-significant acts for the inter-nation situation
1	Minor official exchanges, talks or policy expressions – mild verbal support
2	Official verbal support of goals, values, or regime
3	Cultural or scientific agreement or support (non-strategic)
4	Non-military economic, technological or industrial agreement
5	Military economic or strategic support
6	International freshwater treaty, major strategic alliance (regional or international)
7	Voluntary unification into one nation

In an overall assessment of 1831 empirically documented water-related events we find that the cooperative events are much more frequent (1228), they occurred in 2/3 of the cases, while conflicting events (507) were observed in 28%.[109] Further, indicators were identified, that influence the occurrence of conflictive events, those being: (1) high population density (of more than 100 persons/ sq. km); (2) low per capita income (less than 765 dollars/ person/ year); (3) overall unfriendly political relations; (4) politically active minority groups; (5) proposed large dams or other water development projects; (6) limited freshwater treaties.

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[107] **Basins at Risk** project addressed a series of overarching gaps in research on freshwater resources and international conflict by providing a quantitative, global scale exploration of the relationship between freshwater resources and conflict http://www.transboundarywaters.orst.edu/research/basins_at_risk/

[108] YOFFE, Shira; LARSON, Kelli. **Basis at Risk: Water Event Database Methodology**. Oregon State University, In: Water Policy, 2001, 47 p. WWW: http://www.transboundarywaters.orst.edu/research/basins_at_risk/bar/BAR_chapter2.pdf; YOFFE, S.; WOLF, A. T.; GIORDANO, M. **Conflict and Cooperation over International Freshwater Resources: Indicators and Findings of the Basins at Risk**. In: Journal of American Water Resources Association, 58 p. WWW: http://www.transboundarywaters.orst.edu/research/basins_at_risk/bar/BAR_chapter4.pdf

[109] WOLF, Aaron. **Shared Waters: Conflict and Cooperation**. The Annual Review of Environment and Resources, 2007, p. 29, WWW: http://www.transboundarywaters.orst.edu/publications/abst_docs/wolf_2007_shared_waters.pdf

For more illustration, the Aral Sea basin[110] was selected from the TFDD to provide an idea of how the actual data collection and analysis took place. The extensive event list is mostly derived from sources articles at Eurasianet and Moscow ITAR-TASS World Service and the analysis of these events relies solely on those articles. Whenever there is an agreement mentioned, be it, citing: "1992 Water Treaty, 1993 Kyzyl-Orda Agreement, 1995 Nukus Declaration, 1998 Agreement", the automatic BAR scale rating is 6. On the opposite end of the axis there is the rating of -5 was given to the "Kyrgyz/Tajik clashes at the Afghani border in 1989" and the "feuding groups in Central Asia state of Tajikistan attacked and stole weapons from the Russian troops, Commonwealth television said on Sept 23 1992, not giving details of the attack". From these direct citations it is unclear, what clashes are meant by the data collectors and why this particular TV show was chosen as relevant. The last recorded event is the signing of Eurasian Economic Community in 2004.

It is questionable how representative the picture of water-related events in Central Asia is presented, without a thorough analysis of the bilateral and regional relations, involvement of 3rd parties, not taking account of the power asymmetries in the Aral Sea basin, just mechanically giving numbers to reported events. How can such incomplete data be used for comparative purposes with other trans-boundary basins? We conclude, that the TFDD is an overly ambitious project, found on unflagging data collection, with a very limited possibility to assess the actual state of cooperation and conflict in the trans-boundary water basins.

On the other hand, the evidence from the probably the first extensive study using the data of TFDD applied to water disputes in Central Asia is the work by Valery Votrin[111], proves us wrong. The author uses the analytical framework of BAR, GIS of TFDD and produces a very sound analysis of the proneness of Amu Darya basin to conflicts. He identifies the key indicators of water conflict potential, incorporating a wide range of physical, social, economic and environmental variables to develop a comprehensive model. The conclusion is that in a situation of population density less

[110] **Aral - International Events Database** 1950-2005 http://ocid.nacse.org/tfdd/internationalEvents.php

[111] VOTRIN, Valery. **Transboundary Water Disputes in Central Asia: Using Indicators of Water Conflict in Identifying Water Conflict Potential**. Vrije Universitteit Brussel, Master Programme in Human Ecology, 2003, p. 90, WWW: http://waterwiki.net/images/7/7f/Votrin.pdf

than 50 sq. km (conflict indicator relevant in Ferghana Valley), GDP per capita 461.3 dollars, rapid institutional development of big water infrastructure projects (Rogun Dam, Golden Century Lake), high internalization potential (possible secession of Karakalpakstan; increase in Afghani demand for water, Sarez lake), overall unfriendly relations and limited freshwater treaties signed the potential for conflict over water resources in Amu Darya Basin remains to be high. Even today, many of authors' assumptions proof to be timeless.

The TFDD was used as a base for the Case Study of Trans-boundary Dispute Resolution: Aral Sea[112] and the lessons learned for the other water conflicts were: (1) strong regional economic entity can provide support when issues arise between basin states (CACO played a role of a mediator, when IFAS was facing difficulties) (2) Lack of trust and credibility can hinder the process of cooperation. As for conclusion number one, we do not consider the verification of this statement sufficient and as for the second lesson learned, in case of Central Asia, it cannot be overstated.

The London Water Research Group[113] (LWRG) facilitates the analysis of trans-boundary water management, politics and policy applying the power-analytical approach. Power is understood as the key factor determining the water policy. The main ambition of the research group is to expand the enquiry regarding international water cooperation beyond formal treaties and to understand what in reality constitutes the processes of negotiation and implementation. One of the most significant events organized by the LWRG is the Hydro-Hegemony workshop. This event consolidated the Analytical Framework of Countering Hydro-Hegemonies. Another intellectual product of the research group is the conceptual approach of Trans-boundary Waters Interaction NexuS (TWINS) for analysis of conflictive and cooperative actor interaction.

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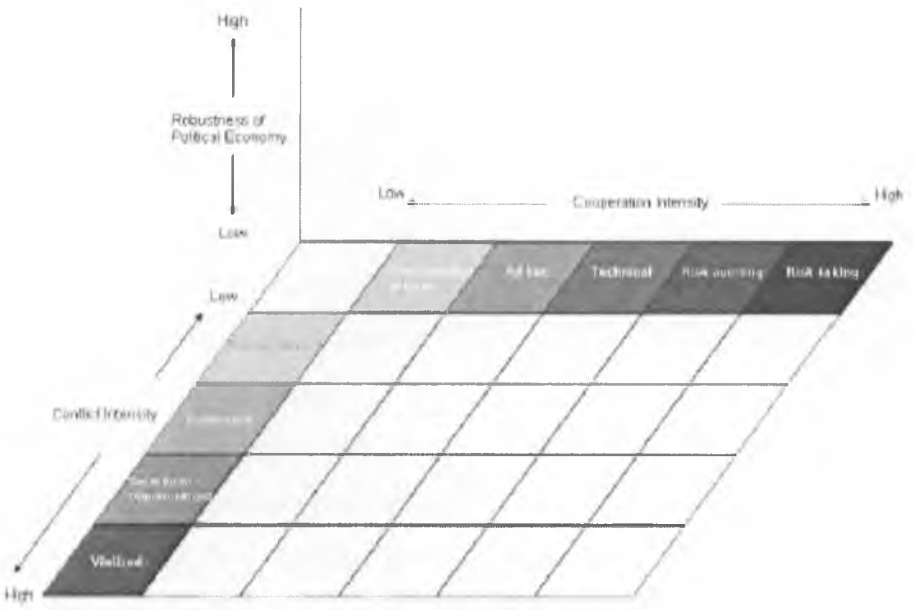
[112] WOLF, Aaron T; NEWTON, Joshua T. **Case Study of Transboundary Dispute Resolution: Aral Sea**. In: PRISCOLI, Jerome D. **Managing and Transforming Water Conflicts**. Cambridge University Press, 2009, 341 p. WWW: http://www.transboundarywaters.orst.edu/research/case_studies/Aral_Sea_New.htm

[113] **London Water Research Group LSE/KCL**: http://www.lse.ac.uk/collections/geographyAndEnvironment/CEPG/LWRG/Default.htm, http://www.kcl.ac.uk/schools/sspp/geography/research/epd/londonwater/

Analyzing conflict and cooperation in trans-boundary water basins on one-dimensional axis, where war constitutes one end and integration the opposite extreme, such as in the BAR scale, does not authentically reflect the realities, because in vast majority of contexts the *conflict and cooperation co-exist.* They appear simultaneously and their interaction is an inherent political process.

The TWINS approach can be illustrated using a tree-dimensional model, where the axes represent cooperation intensity, conflict intensity and robustness of political economy. [114]



TWINS Conceptual Approach
http://www.newater.uos.de/caiwa/data/papers%20session/F3/CAIWA-FullPaper-MirumachiAllan25Oct07submitted2.pdf

The conflict intensity axis stems mainly from the teachings of the Copenhagen School[115] (namely Buzan et. al.). In a nutshell, when non-political issues become a threat to the state, they are prioritized in the national agenda, become "*politicized*" as a part of public policy, requiring government decision and resource allocation. When issues become an existential threat, requiring emergency measures and justifying

[114] MIRUMACHI, Naho; ALLAN, J. A. **Revisiting Transboundary Water Governance. Power, Conflict, Cooperation and the Political Economy**. NeWater, 2007, 21 p. WWW: http://www.newater.uos.de/caiwa/data/papers%20session/F3/CAIWA-FullPaper-MirumachiAllan25Oct07submitted2.pdf

[115] BUZAN, Barry; WEAVER, Ole; WILDE Jaap. **Bezpečnost: Nový rámec pro analýzu**. Brno, Centrum strategických studií, 2005, 267 p.

actions outside the normal bounds of political procedure, they become "*securitized*". "Opportunitized" issues offer improvement of a situation that can be justified outside of the normal bounds of political procedures. The shift towards violization means the movement from normal politics to warfare. Therefore we can say that whether an issue moves up or down the conflict scale depends on the subjective perception of the importance of that particular issue within the national agenda.

As for the cooperative axis, the first recognized level is "*confrontation of issues*". This means an issue is recognized, but no particular action is realized. "*Ad hoc"* collaboration is the next stage, when there are shared actions taken, but no shared goals. "*Technical"* collaboration on the other hand means that there may now be a common goal, but the actions are not necessarily coordinated. The next two cooperative efforts are of high intensity, because here we already presume the possibility of predicting the other actor's behaviour, in "*risk-averting*" cooperation states do not undertake unforeseen cost in the future when committing to such action and finally "*risk-taking*" cooperation as an ideal form of reciprocity.[116]

The change comparing to previous research that the LWRG brought about is, that cooperation is no longer seen as a goal by itself, always desirable and positive. The reasons are first of all, that cooperative events, such as treaties, riparian meetings, annual conferences, joint publications might not at all change the status quo of a water regime. Further, cooperative engagement might be strategic or manipulative, which is one of the research questions of the hydro-hegemonies.

Hydro-hegemony is hegemony at river basin level, achieved through water resource control strategies: resource capture, integration and containment. When assessing hydro-hegemony the factors of power (overall economic/political/military power), position (upstream/downstream) and potential (infrastructure/technological capacity) are combined. Hydro-hegemon defines the rules of the game and can exercise

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[116] ZEITOUN, Mark; MIRUMACHI, Naho: **Transboundary Water Interaction I: Reconsidering Conflict and Cooperation**. Paper presented at Bridging Multiple Divides , San Francisco, 2008, 22 p. WWW: http://www.allacademic.com//meta/p_mla_apa_research_citation/2/5/2/6/9/pages252696/p252696-1.php

two distinct ideal forms of hegemony, the negative, dominant one, or the positive form that benefits all the riparian states (*hegemonic stabilization theory*). In trans-boundary water basins the riparian states act to maximize their objectives, in water scarce regions it is competition over the volume of flow and in water abundant regions in might be control of flow for hydro-power production or control of flow for better flood management. The control of resources can be: (a) shared (cooperated); (b) consolidated in stronger riparian favour; (c) contested. The most stable constellation would be, if the hegemon negotiates an agreement that is perceived positively by all.[117]

Zeitoun and Warner further analyze the mentioned resource capture strategies: *Resource capture* meaning active unilateral actions, whereby a riparian, in the absence of formal underpinnings, moves ahead with projects that affect the flow or quality of a resource, such as construction of large hydraulic works that would create new hydro-strategic realities. *Containment* is when hydro-hegemon co-opts the weaker competitors rather than ignoring their claim, which might involve *integrating* them in as asymmetric a position as possible. The particular tactics are divided into 4 kinds of compliance-producing mechanisms:

(1) Coercive: military force (bombing of a dam), covert action (undercover operations that weaker status of competitor), coercion/pressure (threats of trade embargo, diplomatic isolation)
(2) Utilitarian: incentives (shared benefits)
(3) Normative: treaties and agreements that institutionalize status quo
(4) Hegemonic: securitization, knowledge construction and sanctioned discourse.

For our purpose, it is useful to explain the hegemonic compliance-producing mechanisms in more detail. The first form, *securitization*, was mentioned already in the TWINS approach, on the conflict axis, as a process that legitimizes a state to take exceptional measures over an issue propelling it into the realm of security. As a compliance-producing mechanism, securitization facilitates politician's ability to construct knowledge around water-related issue to fit other political interests. The

[117] ZEITOUN, Mark; WARNER, Jeroen. **Hydro-hegemony – a framework for analysis of trans-boundary water conflicts**. In: Water Policy, № 8, IWA Publishing, 2006, 435-460 p. WWW: http://www.iwaponline.com/wp/00805/wp008050435.htm

second form is *knowledge construction*, which means that different perspectives on hydro-situation are given to population, international donors, neighbouring countries to win manoeuvring room between popular beliefs and science-based knowledge. The last form, *sanctioned discourse* means that constraints are imposed on those that wish to speak outside of discursive hegemony and that certain aspects of riparian relations are veiled, while others are emphasized.[118]

A set of counter-hegemonic strategies is also identified, those being international law, delay, de-securitization, issue-linkage, economic development, alternative funding, negotiations and generation of positive-sum outcomes. It is also important to realise, that hegemonies have multiple levels, domestic, basin level, regional and global, all interacting in many ways.[119]

The findings of the LWRG are being applied to various regional case studies, including Central Asia and we also find the methodology suiting our purpose.[120]

Conclusion

With the ambition to study the trans-boundary water basins from as comprehensive perspective as possible, we have employed two distinct approaches, Management and Security.

Management issues were explored from the "Benefit-sharing" side of cooperation, the "Legal regime" formation and "IWRM".

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[118] ZEITOUN, WARNER (2006) 446 – 450 p.

[119] WARNEN, Jeroen. **Contested Hydro-hegemony: Hydraulic Control and Security in Turkey**. In: Water Alternatives 1 (2), 2008, 271 – 288 p. WWW: http://www.water-alternatives.org/index.php?option=com_content&task=view&id=44&Itemid=1

[120] E.g. SOJAMO, Suvi. **Illustrating co-existing conflict and cooperation in the Aral Sea Basin with TWINS approach**. In: RAHAMAN, Muhammad M.; VARIS, Olli (Ed.). **Central Asian Waters: Social, Economic, Environmental and Governance Puzzle**. Water and Development Publications. Helsinki University of Technology. 2008, 158 s. Also available WWW: http://www.water.tkk.fi/English/wr/research/global/material/Central_Asian_Waters-book.pdf; WEGERICH, Kai. **Hydro-hegemony in the Amu Darya basin**. Irrigation and Water Engineering group, Wageningen University, 2006, In: Water Policy, 10 (2), 71-88 p.

Benefit sharing explains what drives riparian states into cooperation. The "game theory" and "common pool resources" were used to illustrate benefit sharing. Suitable conditions for cooperation were defined and possible benefits systemized. Questions of how to foster benefit sharing and the existing compensating procedures were defined. The different stakeholders in trans-boundary river basins were listed with special attention paid to regional integration arrangements. Some problems with applicability of benefit sharing were suggested. The section Legal regimes gave an introduction to theory of trans-boundary rivers, legal doctrines and core principles of international law. The Convention on the Law of the Non-navigational Uses of International Watercourses was chosen from the international legal instruments to explain the ongoing debates. Power, interest, knowledge and context were used to explain the regime formation on trans-boundary water courses and ways to measure success or failure were plotted. IWRM was explained as a concept in the context of the global debates that shape it.

Security issues were viewed upon from the framework of "Environmental security", "Conflict and cooperation", "Water wars" and "Hydro-hegemonies".

Environmental security was put into context with human security and the development of the concept was offered, analyzing the key ideas of the main schools of thought: ENCOP, Toronto group, PRIO. The water war hypothesis was tackled by empirical, strategic and historical evidence and argumentation was analyzed through questing demand and supply side. Ideas such as "turn of the screw" and "virtual water trade" were clarified. Environmental peacemaking was suggested as an alternative framework and some conflict prevention measures were given. The research of Oregon State University and London Water Research Group were presented as solid works on conflict and cooperation in trans-boundary basins. The Hydro-hegemony framework was suggested as a way to assess environmental security issues without de-emphasizing the power aspects.

Let's now address the hypotheses that were phrased in the introduction. First it was argued, that Management and Security are two distinct perspectives. Indeed, the water professionals, concerned mostly with management ask "How to make optimal use of water resources", while security agencies and states ask "How to minimize the

occurrence of violence over water". These two perspectives on water utilization challenges in trans-boundary river basins are more interlinked, as expected. With the expanding range of issues and paradigmatic development, Management and Security are being driven closer together and often overlap and converge. Water management is in a way conflict management and conflict prevention is a good example of water governance. Securitization of a management issues drives more attention of the international community and prioritizes issue on national agenda. On the other hand, de-securitization can be a better strategy in dispute resolution. Management is nowadays more involved with linking the economic, environmental, social and political; while Security is focusing more on conflict prevention and not only wars, but also disputes.

When it comes to politics: "Everything is political". It is important to realize the different existing power ambitions and interests in trans-boundary water basins. The riparian states all have very different perspectives on the challenges of the basin and the states are only one of the layers of the relevant stakeholders involved. Also it needs to be stressed, that 4 domains of politics co-exist: (1) Everyday politics of water control, (2) Politics of national water policy, (3) Inter-state hydro-politics, (4) Global politics of water.[121] Under a lot of simplification, it could be perhaps claimed that politics determines whether cooperation or conflict develops in a basin. It does not necessarily have to be one or the other it could be both conflict and cooperation simultaneously. The claim over superiority of cooperation over conflict was tackled with arguments such as cooperation as hegemonic status quo, or as a manipulative strategy. Conflict on the other hand does not necessarily mean disaster it can be a decisive action, turning point sign of opportunity.

The last made hypothesis that conflict could "spill-over" to war and cooperation could "spill-over" to integration is based on the phrasing of Neo-functionalists. Although there is an academic consensus that a war over water as a single-cause conflict, would not be strategically nor economically viable and will therefore not be launched; public speakers and respected politicians, in particular the Secretary Generals

[121] (Ed.) SCHEUMAN, Waltina; NEUBERT, Susanne; KIPPING, Martin. **Water Politics and Development Cooperation. Local Power Plays and Global Governance.** German Development Institute, Berlin: Springer, 2008, 416 p.

of United Nations[122] like making references to water wars, which with the help of "sensationalist" media makes this idea pervasive in people's minds. How about making the opposite claim? If water is looked upon as a strategic commodity[123], successful riparian cooperation on non-controversial issues could lead to a functional "spill-over", when actors gradually involve themselves into more sophisticated levels of social and economic cooperation, or even integration. It is uneasy to verify such hypothesis. Researches have so far identified the opposite tendency, that where a high level of regional integration exists, there the water regime formation is more likely.

Now this theoretical background will be tested in the region of Central Asia. How do the global debates resonate in the research on this region and what are the cultural reconsiderations that need to be made in the Central Asian context.

[122] "The next war will be fought over water, not politics". (Boutros Boutros-Ghali) "Fierce competition for freshwater may well become a source of conflict and wars in the future". (Kofi Annan) Only recently, Ban Ki-Moon gave an environmental interpretation of the Darfur conflict, linking it to water scarcity.

[123] Such as in the case of coal and steel in Europe after 2nd World War

2. Trans-boundary Watercourses in Central Asia

2. 1 Introducing the Factor of Water in Central Asia

Beyond any doubt, water is the crucial prerequisite for human development.[124] In this chapter we will go as far as claiming, that in the region of Central Asia, this statement can be validated even more obviously than in the rest of the world. There are three main arguments to support our claim:

Firstly, we see an extraordinarily strong link between the rivers and the population of Central Asia.

Secondly, we perceive that the region of Central Asia became a focal point of external international interest in the context of the Aral tragedy.

Thirdly, we realize that in contemporary Central Asia there is an extensive tendency of securitization of water.

Let's now involve in clarifying these claims. It is true, that most ancient civilizations shaped around grand watercourses. Karl Wittfogel made a remarkable contribution to the research of hydrological societies, by explaining how the monopolization of hydrological infrastructure enabled oriental leaders to establish a despotic rule with huge bureaucracies.[125] The first statement, about the strong linkage between the population and rivers, is grounded on the fact, that water forms an inherent element of Central Asian identity. In classical texts, the region is in fact referred to as Transoxiana.[126] On one hand, great cities such as Bukhara and Samarquand have been built in the proximity of water, on the other hand, the element of water contributed to

[124] UNDP. **Human Development Report 2006. Beyond scarcity: Power, poverty and the global water crisis.** Palgrave Macmillan: New York, 2006, 440 p.

[125] WITTFOGEL, Karl A. **Oriental despotism: A comparative study of total power.** London: Oxford University Press, 1957, 556 p.

[126] Land on the other side of the Oxus River, today called Amu Darya

the demise of Old Urgench.[127] There are several important factors that in one way or another shape the attitudes of Central Asian people towards water management. Above all, it is the great several thousand year long experience with estuary and irrigational farming in mostly semi-arid conditions. This notion is sometimes reflected and articulated by the indignation to some of the recommendations coming from the international community. Reading between the lines, this basically means, "what could they possibly know about our waters".

It is particularly important to sketch how the system of beliefs and traditions influence water management. Plotting these cultural determinants of the Central Asian water management "genius loci" is rather problematic, as such generalizations automatically produce simplifications. Therefore the below mentioned factors should by no means be understood as an exhausting picture, but rather a reminder of some cultural consideration.

Water has an evident spiritual value[128] and in the Central Asian context, we give particular importance to the role played by the Zoroastrian cosmogony and Islamic law. Zoroastrianism perceives water as the source of wisdom and together with fire they are the life-sustaining agents of ritual purity.[129] In Islamic law, when a water owner prevents anybody from using water for himself or for his cattle, this person has a right to challenge the owner with weapon.[130] Also the conception of water as a "gift from God" resonates in the region, just like the esteemed social role of mirabs (the water masters), aksakals (the elderly) or other traditional institutions. It is fascinating to observe, how these practices intermingled with some elements of the ideology of

[127] Under Genghis Khan and a trinity of his bold commanders Djutchi, Chagathai and Ugadei, in 1221 after a useless siege of the city of Old Urgench (Gurgandzh, Gunya-Urgench) a dam on Amu Darya was demolished, which caused the flooding of the rebellious city. For more details see: HIDOYATOV, G. A. **My Native History**. Cited in: VALENTINI K. L.; OROLBAEV E. E.; ABYLGAZIEVA A. K. **Water Problems of Central Asia**. International Strategic Research Institute under the President of the Kyrgyz Republic: Bishkek, 2004, 142 p. WWW: http://library.fes.de/pdf-files/bueros/zentralasien/50116.pdf

[128] **Prague Forum 2000**, Exploring Water Patterns in the Middle East 2008, Discussion table on Spiritual value of Water, October 2008, WWW: http://www.forum2000.cz/en/projects/middle-east-water/2008/

[129] Based on an Interview with Zhibek Saparbekovna Sizdikova, Director of Centre of Central Asian and Caucasian Studies, Institute of Africa and Asia, Lomonosov Moscow State University, October 2007

[130] BOZOV, Kadyrbek. **Central'naya Aziya: Fragmental'nyj vzglyad na proshloe i vodnye problemy.** Ferghana.Ru, July 25, 2002, WWW: http://www.ferghana.ru/article.php?id=650

communism. In particular, it is the understanding of human superiority over natural resources[131] and the enthusiasm for grand solutions accompanied with the ability to mobilize enormous resources, human and capital, in order to attain future "Golden Age" or the ambitious long-term development strategies[132].

Self-evidently, water in Central Asia is a particularly important factor of economic development and source of revenue, schematically both for the water-rich upstream countries that benefit from their hydro-based energy, just like for the water-poor downstream countries that benefit from their hydro-based agriculture.

Moving on to the second raised point, it has been suggested, that the Aral tragedy brought Central Asia as a region on the top of international agenda, in terms of investors, research and focus of external interest. The timing of this raised interest corresponded with the revived focus of global environmental debates in water issues, when the environmental security theories needed to be tested on case studies and the Neo-mathsuian logic authenticated. Above that, the Aral Sea crisis was a unique test-case to link economic and political reforms with environment and conflict issues.[133] To express the scope of foreign experts visiting the region, somebody wittily remarked, that if every international delegation brought along a bucket of water, the Aral crisis would be resolved. The Aral Sea tragedy will be dealt with in greater details below.

The last argument to support our initial hypothesis is the rising securitization of water issues in Central Asia. This tendency is not only linked to the potential of natural disasters (floods, draughts, dam security), but also plays a significant role in the interstate relations, on a bilateral and regional security level (Shanghai Cooperation Organization, Collective Security Treaty Organization). Increasingly, water is being

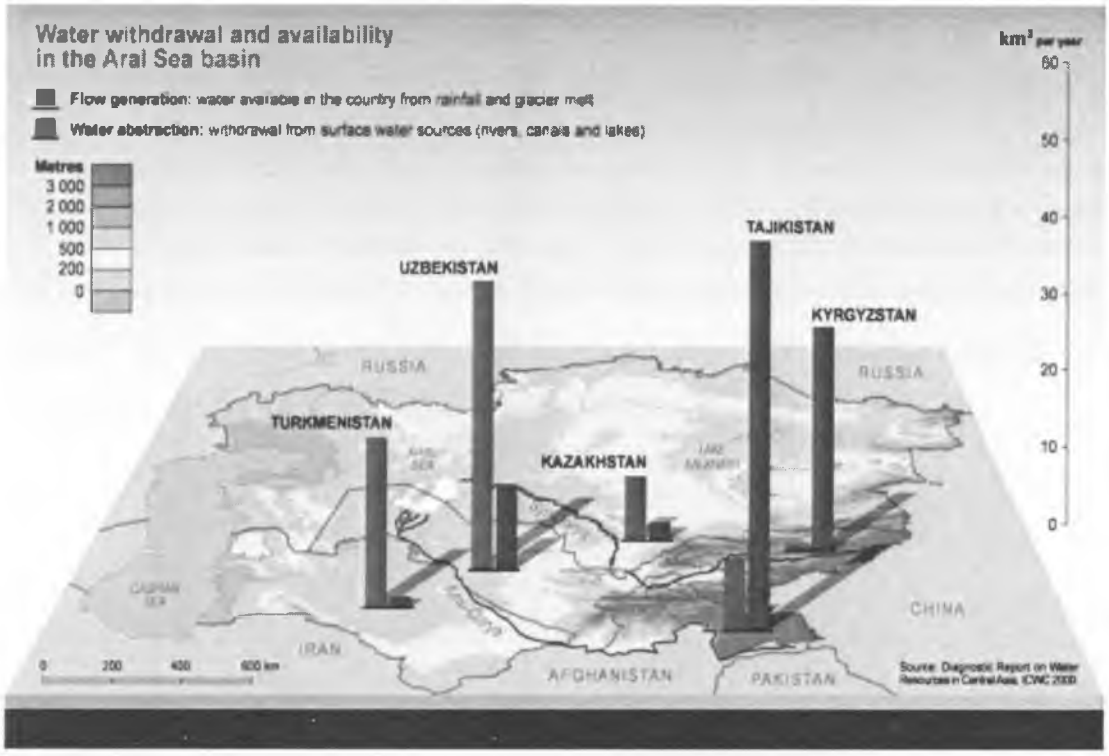
[131] Perhaps best described by the idiom that „water will flow, where the Bolsheviks will order it to".

[132] Such as the **Long-term Strategy of Development of Kazkhstan: Kazakhstan-2030: Prosperity, security and improved living standards for all Kazakhs**. WWW: http://e-news.kz/info/Kazakhstan2030.pdf

[133] WEINTHAL, Erika. **The Promises and Pitfalls of Environmental Peacemaking in the Aral Sea Basin**. In: Ed. CONCA, Ken; DABELKO, Geoffrey D. **Environmental Peacemaking**. Woodrow Wilson Center Press: Washington D. C, 2002, p. 244

mentioned by the highest state representatives[134] as the priority of national security and is being dealt with within the security-realm. It is because in the Central Asian context, the link of water to both energy and food security is particularly strong as has been demonstrated during the cold winter of 2007/08, when a "compound crisis" evolved.

Now we shall characterize the water situation in Central Asia. In spite of the common perception, that the region suffers an immense water shortage, according to the empirical evidence, such as the water-poverty index[135], this is not the case. The main problem is the extreme water wasting. If we take as the indicator of water scarcity the annual 1000 cu. m/ capita[136], then states that are bellow this line can be characterized as water scarce. None of the five Central Asian republics falls under this category.



Water Withdrawal and Availability in the Aral Sea Basin
Cartographer/designer: Philippe Rekacewicz, UNEP/GRID-Arendal
Sources: ICWC. 2000. Diagnostic Report on Water Resources in Central Asia
http://maps.grida.no/go/graphic/water-withdrawal-and-availability-in-aral-sea-basin

[134] In particular of Kyrgyzstan and Tajikistan. E.g. Ferghana.Ru. **Kyrgyzstan: Prezident schitaet "vodnuyu" problemu odnoj iz glavnych ugroz natsional'noj bezopasnosti**. February 12, 2009, WWW: http://www.ferghana.ru/news.php?id=11285

[135] LAWRENCE, Peter; MEIGH, Jeremy; SULLIVAN, Caroline. **The Water Poverty Index: an International Comparison**. Keele Economics Research Papers: Keele, October 2002, p. 24, WWW: http://www.keele.ac.uk/depts/ec/wpapers/kerp0219.pdf

[136] Falkenmark index

However, as the chart above illustrates, there is a striking imbalance in the amount of water that each country of the Aral Sea basin provides and uses. Due to the uneven distribution of water resources, the countries are often schematically referred to as water-rich (upstream mountainous Kyrgyzstan and Tajikistan) and water-poor (downstream lowland Uzbekistan, Kazakhstan and Turkmenistan). Although this is a crude simplification[137], it helps us to better understand some of the tendencies and interdependencies of the emerging inter-state relations. When not less than 98% of Turkmen and 91% of Uzbek water supply originates outside of their borders, there is a clear dependency on the upstream countries. However, this dependency is to an extent mutual, as the upstream countries do not have the means to cut off their downstream neighbours permanently. Both upstream and downstream countries use leverages against each other to attain their individual goals. Pragmatically, sometimes coalitions are formed, if this helps the achievement of the national interests.[138]

In Central Asia, instead of dealing with the simple upstream/downstream relations, the water management issues need to be considered. The main destabilizing factors that could influence the sustainable water management have been summed up as a preparation for the 5th World Water Forum as follows[139]:

1. Population growth
2. Urban population
3. Changes in crop pattern
4. Raising environmental awareness
5. Climate change[140]

[137] Why is this a simplification? For example because Afghanistan, although generating about 19% of the flow is not included in the graph; or because the mountainous Tajikistan can also play the role of a downstream country in relation to Kyrgyzstan on Syr Darya; or because interesting constellations emerge also between mid-stream and downstream countries, such as Kazakhstan and Uzbekistan on Syr Darya; or because the inter-state level does not always best represent the constellations of local relevance; or because unresolved border and minority issues are not considered …

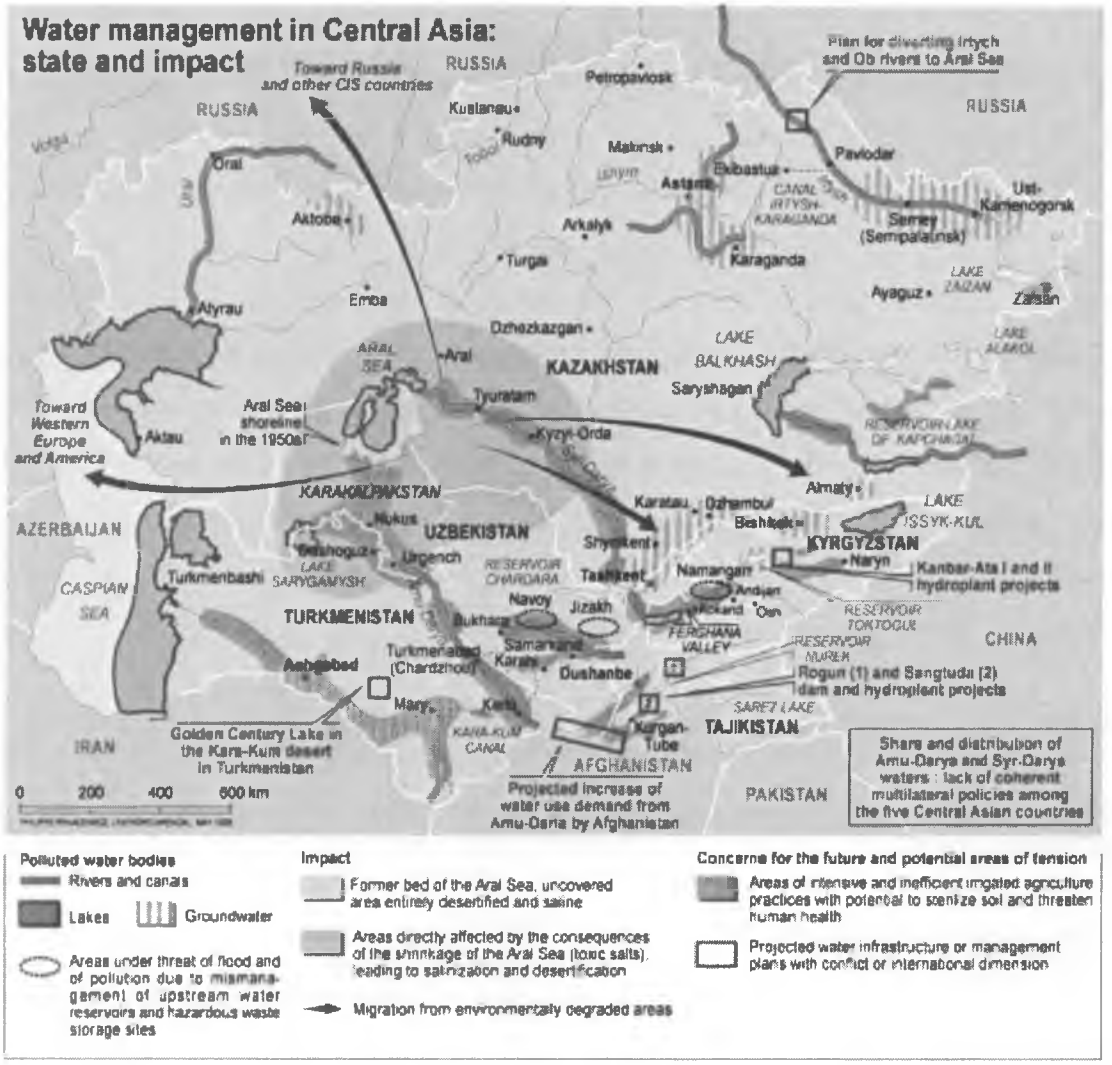
[138] E.g. the recent (April 2009) Uzbek attempt to formulate a downstream alliance, a rare example of regional diplomacy, as opposition to the construction of new hydropower plants upstream

[139] **Towards to 5th World Water Forum. Reports from Central Asia**. ICWC/GWP CACENA: Tashkent, 2009, p. 58, WWW: http://www.cawater-info.net/library/eng/5wwf_ca_reports_en.pdf

[140] For more information see e.g. **Adaptatsiya k izmeneniyu klimata: problemy regiona v svete mirovogo opyta**. ICWC SIC: Tashkent, 2008, p. 48, WWW: http://www.cawater-info.net/library/rus/carewib/adaptation_climate_ru.pdf

6. Progressing variations of world prices on agricultural products
7. Increase in use of hydropower potential
8. Possible increase in water withdrawal from Amu Darya River by Afghanistan

The demographic challenge of the rising population level is mostly felt in the Ferghana Valley. The ICWC gives the figure that if the annual increase would be 1.5% (0.5 million people) and if the minimal annual water requirement per capita is 1200 cu. m, every year 700 million cu. m of additional water resources would be necessary.[141] The water management challenges are further complicated by the aging water infrastructure and the low level of capital investments and insufficient operation and maintenance financing.



Water Management in Central Asia: State and Impact

[141] **Towards to 5th World Water Forum. Reports from Central Asia**. ICWC/GWP CACENA: Tashkent, 2009, p. 58, WWW: http://www.cawater-info.net/library/eng/5wwf_ca_reports_en.pdf

Cartographer/Designer: Philippe Rekacewicz, UNEP/GRID-Arendal
http://maps.grida.no/go/graphic/water_management_in_central_asia_state_and_impact1

The map above illustrates many of the trans-boundary water management constellations in Central Asia that will be analyzed more thoroughly in this chapter. It is interesting to note the arrows that indicate the directions of migration from environmentally degraded areas.

Geopolitically, Central Asia is located on the super-continent of Eurasia[142] and it plays a crucial role as a transit hub, as a source of energy, and as a potential source of stability or conflict its role is key.[143] Being an object rather than actor of the "Great political game"[144], the land-locked[145] countries are forced to interact with their powerful neighbours. Simultaneously, both Uzbekistan and Kazakhstan are aspiring for the role of the regional hegemony. Simply said, Uzbekistan supports this ambition with the argument of having the largest population among all Central Asian countries (27.6 million) and Kazakhstan emphasizes its' vast area (2.7 million sq. km).

However, what is relevant for geopolitics does not necessarily have to be of key importance in hydro-politics. Although hydro-politics is subordinate to the broader political picture, there is not a univocal hydro-hegemony present in the Aral Sea basin. But on the other hand, the struggle for regional hegemony has its' reflection also in waters. We will now shortly sketch each of the 5 Central Asian country profiles, with special attention paid to water. Particular consideration will be given to the trans-

[142] See more E.g. OLCOTT, Martha. B. **Central Asia's Second Chance**. Carnegie Endowment for International Peace: Washington, D. C., 2005, p. 404. Basic studies that deal with geopolitics of Eurasia:

BRZEZINKSI, Zbigniew. **The Grand Chessboard: American Primacy And Its Geostrategic Imperatives**. Basic Books: New York, 1997, 240 p. DUGIN, Aleksandr G. **Osnovy geopolitiki** (geopoliticheskoe budushchee Rossii. Arktogeya: Moscow, 1997, 608 p.

[143] LINN, Johannes F. **Connecting Central Asia with the World**. Prepared for the First Eurasian Emerging Market Forum, Gerzensee, January 31 – February 2, 2009, 21 p. WWW: http://www.brookings.edu/papers/2009/0202_central_asia_linn.aspx

[144] For a thorough analysis of the external influences on Central Asia and a summary of the key relevant actors, see E.g. HORÁK, Slavomír. **Rusko a Střední Asie po rozpadu SSSR**. Karolinum: Praha, 2008, 226 p.

[145] Uzbekistan is one of the two double-landlocked countries of the world (the second is Lichtenstein), which means that it is only surrounded by landlocked countries. Kazakhstan holds the prime of being the largest landlocked country.

boundary water factors. We are interested, what is the water image and strategies of the riparian states of the Aral Sea basin.

2. 1. 1 Uzbekistan

In the Soviet-time stereotypical phrasing, the Uzbeks have been perceived as the "water people" in contrast to Kazakhs being the "oil people".[146] This indicated that the Central Asian Research Institute for Irrigation (SANIIRI) was located in Tashkent. Many experts on hydraulic engineering, land reclamation and water management were being shaped by this institution. Since 1993, the Institute also houses the Scientific-Information Centre of the Interstate Coordination Water Commission (ICWC).

Even today, Uzbekistan plays a disproportionately high role in influencing the regional water management. Uzbekistan is a riparian in both Amu Darya and Syr Darya sub-basins and among the Central Asian countries it has been most severely damaged by the Aral tragedy[147]. The basin water organizations are located in Uzbekistan, employing mostly Uzbek staff. [148] On international forums the Uzbeks have the mandate to represent the whole region.[149] This is particularly interesting in regards to which projects should be financed preferentially.[150] Since the ICWC does not have the

[146] WEINTHAL (2002), p. 107

[147] According to Shamat Khamrayev, the Deputy Minister of Agriculture and Water Resources the annual damage from the environmental disaster for Uzbekistan is US$ 144. 83 million.

[148] Even with the best possible intentions, currently, the feeling of regional identity is rather weak in Central Asia. Therefore although the logic of basin wide management requires thinking in terms of "benefit sharing" and "hydro-solidarity" for the region, this is a rather difficult mental exercise. Conducting various interviews we noticed, that the term "we" is rarely used to refer to the region, but rather indicates national affiliation.

[149] Here a particular tribute will be paid to Prof. Victor Abramovich Dukhovny, the Director of the SIC ICWC, author of 17 monographs and 30 patents, who's activities are well known among CIS countries and internationally. Besides being involved in work on transformation of the Hunger Steppe into the densely populated oasis and participating at active organization of water partnerships including IFAS, ICWC and GWP CACENA, he promotes regional interests in the International Commission on Irrigation and Drainage. Prof. Dukhovny has been elected a member of the board in the World Water Council and in the International Water Resources Association

[150] E.g. After the experience with implementing IWRM-Fergana, the next pilot project are situated into lowlands, E.g DUKHOVNY, Victor. A; HORST, Mikhail G. **Transition to IWRM in Lowlands of the Amu Darya and the Syr Darya rivers**. In: MAKHMUDOV, Ernazar J. **Transboundary Water Resources: A Foundation for Regional Stability in Central Asia**. NATO Science for Peace and Security Series C: Environmental Security. Springer: Dordrecht, 2007, 313 p

mandate for energy issues, irrigation continues to be the driving force of the decision making.

Besides the geopolitical advantages, of having the strongest military power, biggest population, intensive cotton production (as a source of DFI) and having the control over regional electricity lines, Uzbekistan is vulnerable because most of it's water supplies originate abroad. The country, although being a large water consumer, has a limited ability to influence the volume and timing of the flow. Therefore, understood as a complimentary foreign policy tool, Uzbekistan is extensively appealing to international law. In particular as a sign of opposition to the new upstream hydropower enhancement plans, objecting with the "no-harm principle" which is symptomatic for downstream countries. Another question is whether these commitments are honoured and implemented.[151]

2. 1. 2 Kazakhstan

Kazakhstan is the first former Soviet-republic that will assume the presidency of the OSCE. Beyond any doubt, this will bolster the international status of the country and perhaps to a certain extent legitimize the aspirations of the president Nursultan Nazarbayev as a regional leader.[152] Besides, hopefully since 2010, under the Kazkah chairmanship, more attention will be paid to the Economic and Environmental Dimension of OSCE, which supports such initiatives as ENVSEC[153]. Also Kazakhstan became the new head of IFAS and hosted the Aral Sea Water Summit in April this year.[154]

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[151] UN Uzbekistan. **Analysis of Gaps between Uzbekistan's Legal Environment and the UN Conventions, Treaties and other Legal Instruments that Uzbekistan is Party to**. Tashkent, 2007, p. 28, WWW: http://www.un.uz/publications/publication.php?id=92

[152] WEITZ, Richard. **OSCE Designates Kazakhstan as First Central Asian Presidency.** CACI Analyst, December 12, 2007, WWW: http://www.cacianalyst.org/?q=node/4756; Human Rights Watch. **Kazakhstan: OSCE Chairmanship Undeserved**. November 29, 2007, WWW: http://www.hrw.org/en/news/2007/11/29/kazakhstan-osce-chairmanship-undeserved

[153] ENVSEC. Environment and Security: http://www.envsec.org/

[154] Ferghana.Ru. **Kazakhstan: Na sammite po spaseniyu Arala lidery stran Tsentral'noj Azii podpisali sovmestnoe zayavlenie**. April 28, 2009, WWW: http://www.ferghana.ru/news.php?id=11813; LILLIS, Joanna; TRILLIG, David. **Kazakhstan: Central Asian Leaders Clash over Water at Aral Sea Summit**. Eurasia Insight, April 29, 2009, WWW: http://www.eurasianet.org/departments/insightb/articles/eav042909.shtml

The foreign policy of Kazakhstan is consistent and the relations to all the key external powers balanced. In the field of global hydro-politics is particularly interesting the dialogue with Russia and China.[155] Further, Kazakhstan is a supporter of such regional integration groupings, as the Eurasian Economic Community (EurAsEC) and Organization for Central Asian Cooperation (CACO) and advocates the idea of forming a Water-Energy Consortium that could resolve the regional conflicts. The Consortium might prove to be just another of the "grand integrators" ideas with not much essence. The idea however resonates regionally, Kyrgyzstan and Tajikistan support the formation of such a Consortium as a platform for constructing new hydro-energy objects, while Uzbekistan and Kazakhstan see it as a guarantee of stabile water supplies for agriculture. The Consortium would operate under a carefully drafted agreement, practicing "issue linkage" between water and energy and operating as a financial mechanism to coordinate the existing cooperation gaps and an arbitration mechanism in case of disagreements.[156] The idea of Water-Energy Consortium needs to be elaborated further, which will probably be done in mid-term perspective.

In general, Kazakhstan is probably most of all Central Asian countries open to regional cooperation initiatives, as such format allows the best nationalization of trade-offs and internalization of cost. Kazakhstan influences the region significantly financially via the remittances from migrant workers. Also, the country has enough capital to support development cooperation projects, such as the idea to establish a Central Asia Development Organization.[157] However, being rich in other natural resources, hydro-politics is not the sole platform for Kazakh strategies.

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[155] The Sino-Kazkakh (and Sino-Kyrgyz) trans-boundary water issues are beyond the scope of this thesis

[156] LINN, Johannes F. **Water-Energy Links in Central Asia: A Long-Term Opportunity and Challenge**. June 30, 2008. WWW: http://www.brookings.edu/opinions/2008/0630_central_asia_linn.aspx?p=1

[157] For more insight see e.g. the country report of the Republic of Kazakhstan for the 5th World Water Forum prepared by Anatoly Ryabtsev, the Chairman of the Committee for Water Resources, Ministry of Agriculture, Republic of Kazakhstan WWW: http://www.cawater-info.net/library/eng/5wwf_ca_reports_en.pdf

2. 1. 3 Tajikistan

The upstream Tajikistan gives the foremost significance to water as a factor of regional and international relations. Water is seen as the Tajik opportunity to develop it's hydropower potential, irrigation and attract investors, catching up the development declined during the civil war (1992-97). Further, water is perceived as a great chance to create an image for the country to represent itself in the world. This can be proved by the fact, that all significant global water events are visited personally by the President Emomali Rahmon, who presents himself a as the "water ambassador". [158] Rahmon is the initiator of the International Decade of "Water for Life" (2005-2015). Delivering his speech at the 63rd Session of the General Assembly of United Nations in New York, the President invited the world community to participate at the International Freshwater Forum, that is to take place in Dushanbe (2010), and has the main goal to evaluate the existing progress of the proceeding Water Decade.[159] Further, the President emphasized the link between human dignity and the "right to water", which is peculiar in the context of the Tajik parliament recently introducing a tax for water.[160]

Three more short remarks on Tajikistan and water: Firstly, it needs to be taken into account that during the extraordinarily harsh winter 2007/08 the country suffered the most of the region by the "compound crisis", which however brought along one positive externality - the raised international interest in Tajikistan. Secondly, there is an increasing attention to solving the security challenge of the lake Sarez and turning this risk into an opportunity[161]. Finally, Tajikistan just passed on the presidency of the IFAS to Kazakhstan, after heading the Fond for a period of six years.

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[158] E.g. Asian Pacific Water Summit (2007), World Water Forum (2009)

[159] **Vystuplenie prezidenta Respubliki Tadzhikistan Emomali Rahmona na 63-oj sessii General'noj Assamblej OON**. Official website of the President of Tajikistan, September 25, 2008, WWW: http://www.president.tj/rus/novostee_250908a.html

[160] Ferghana.Ru. **Tadzhikistan: Parlament vvel nalog na pol'zovanie vodoj**. February 2, 2009, WWW: http://www.ferghana.ru/news.php?it=11291

[161] STEWART, Bruce. **Evolving hazards – and emerging opportunities**. World Water Development Report 3, Water in Changing World, Chapter 12, 211- 225 p. WWW: http://www.unesco.org/water/wwap/wwdr/wwdr3/pdf/24_WWDR3_ch_12.pdf; For more insight see the summary of findings of the Conference held in Dushanbe in June 2008: PAPYRIN, Leonid. **Voda i stichijnye bedstviya. Ferghana.Ru,** September 2, 2008, WWW: http://www.ferghana.ru/archive/2008/papyrin_2008_august.html

2. 1. 4 Kyrgyzstan

Kyrgyzstan perceives it's abundant water supplies as national property and therefore is careful about using such terms like international or trans-boundary waters. In the year 2001 a law was passed by the Kyrgyz parliament and signed by President Asker Akayev on "the inter-governmental use of water resources, dams and other water-related installations" stating that "water has an economic value in all it's competing uses and should be recognized as an economic good", which is the wording transformed from the 1992 Dublin Statements.[162] In reality, the principle of sharing operation and maintenance costs is applied for example in the Chu-Talas basin, between Kyrgyzstan and Kazakhstan. For Kyrgyzstan water is a strategic resource and as an upstream country it has the option of controlling the timing of the flow.[163]

Kyrgyzstan recently due to financial reasons declined the option of heading the IFAS and instead Kazakhstan took over. There were some bilateral off-screen talks that if Kyrgyzstan supports Kazakhstan's OSCE presidency, the latter will support the International Water-Energy Academy to be placed in Bishkek.[164] The Academy should function as a regional platform for the negotiation of water and energy issues, funded and equally represented by all 5 countries with equal representation. Joint research shall be conducted and the institution should educate new "T-shaded" experts with a wide vision, trained not only in hydrology, but also in basics of economy, law and social sciences.[165]

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[162] HELTZER, Gregory E. **Stalemate in the Aral Sea Basin: Will Kyrgyzstan's New Water Law Bring the Downstream Nations Back to the Multilateral Bargaining Table?** Georgtown International Law Review, January 2003, http://www.angelfire.com/md3/heltz/

[163] **Vodno-energeticheskaya politika Kyrgyzstana v kontekste geoekonomicheskogo i strategicheskogo resursa v razvitii** Tsentral'no-Aziatskogo regiona. Round table Institute for Public Policy, Bishkek, February 22, 2008, WWW: http://www.ipp.kg/ru/analysis/616/; and Speech of Prime Minister of the Kyrgyz Republic I. Chudinov at the Fifth World Water Forum Summit, Istanbul, March 16, 2009

[164] The idea of the Academy was first presented by Klaus Grevlich, the Ambassador of Germany in Kyrgyzstan in 2007 (During the German Presidency of the EU there was a raised interest in the Central Asian region). For more insight check e.g. GORBACHEV, Igor'. **V Kyrgyzstane zakonchena razrabotka koncepcii obrazovaniya Mezhdunarodnoj vodnoenergeticheskoj akademii**. February 2, 2009, IA 24.kg. WWW: http://www.24.kg/economics/2009/02/02/105021.html

[165] Based on an interview with Vadim Sokolov, Deputy Director of SIC ICWC, 5th World Water Forum Istanbul, March 19, 2009

2. 1. 5 Turkmenistan

After the death of the great Turkmen leader Saparmyrat Nyýazow, the challenge of overcoming the international isolation, pursued by Türkmenbasy under the rhetoric of "permanent neutrality" was inherited by the new President Gurbanguly Berdimuhamedov and observed with inquiring interest by the international community.[166] So far it appears that Turkmenistan is becoming more involved in regional cooperation. An example of verification of this claim is the October 2008 Summit of Commonwealth of Independent States (CIS) in Bishkek, where the Turkmen leader appealed to the universally recognized norms and principles of international law with regards to tackling the problems of trans-boundary water resources in Central Asia. Another example is the IFAS meeting of heads of states in April 2009, where Gurbanguly Berdimuhamedov suggested to launch a joint energy system for the region to provide the resources to save the Aral Sea.[167]

A promising milestone in this cooperative tendency is the establishment of the UN Regional Preventive Diplomacy Centre in Ashgabat, headed by Miroslav Jenča. Rational use of water and energy resources has been listed among the priority areas of this new pilot structure of the UN. Ashgabat provides the neutral mediating grounds for the facilitation of the dialogue to address the most pressing regional problems and threats. The Centre works in close cooperation with all the Central Asian governments and has the potential to coordinate the OSCE, CIS, Shanghai Cooperation Organization activities, in the areas of water and energy governance.[168]

In a nutshell, the individual country profiles of the Aral Sea basin riparian states have been summed up. For each of the states, there is the significant challenge, to bridge the gap between domestic and international politics when reaching any agreement among each other. Robert Putnam addressed this dichotomy through the game theory, as

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[166] For more insight see: HORÁK, Slavomír; ŠÍR, Jan. **Dismantling Totalitarianism? Turkmenistan under Berdimuhamedow.** Silk Road Paper, Central Asia-Caucasus Institute Silk Road Studies Program. March 2009, http://www.isdp.eu/files/publications/srp/09/js09turkmenistanunder.pdf

[167] Ferghana.Ru. **Kazakhstan: Na summite po spaseniyu Arala liderry stran Tsentral'noj Azii podpisali sovmestne zayavlenie.** April 28, 2009, WWW: http://www.ferghana.ru/news.php?id=11813

[168] Interview with Miroslav Jenča: **Preventive Diplomacy Gathers Momentum in Ashgabat**. Turkmenistan Magazine, February 2009, WWW: http://www.turkmenistanembassy.org/turkmen/news/news02-28-09.html

a 2-level game.[169] This theoretical background has been applied to Central Asian water management to better illustrate the interaction of the domestic and international pressures present in the Aral Sea basin.[170] In this context it is interesting to realise, that the cooperation between the newly independent riparian states in Central Asia was both internally and externally driven. For example, it was internally in the interest of the riparians to conclude an Agreement for an uninterrupted planting season with cotton harvest. Externally, the newly independent states entered into cooperative accords as a signal to the international community, in particular Russia, defining their statehood and demonstrating their external sovereignty.[171]

The first international multilateral agreement in the NIS region was reached in Central Asia. It is shortly referred to as the Almaty Agreement of 1992 and establishes cooperation in the field of joint water resources management and conservation of interstate sources between the five Central Asia countries. [172] According to Article 1, the water resources are defined as being common and intergral; Article 3 enacts the "no harm principle" and pursuant to Article 7, the parties decided to create the parity-based Interstate Coordination Water Management Commission (ICWC). The ICWC is responsible for working out the water use limits for each Republics and also for the operation schedule of water reservoirs. Further, the Basin Water Organizations (BVOs) Syr Darya and Amu Darya, that were to implement the water allocations among different users, were established.[173] The following summits and declarations (Kyzyl-

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[169] PUTNAM, Robert D. **Diplomacy and Domestic Politics: The Logic of Two-Level Games**. International Organization, Vol 42, № 3, Summer 1988, p. 427-460, WWW: http://links.jstor.org/sici?sici=0020-8183%28198822%2942%3A3%3C427%3ADADPTL%3E2.0.CO%3B2-K

[170] KARAEV, Zainiddin. **Managing the Water Resources in Central Asia: Is Cooperation Possible?** Workshop "Resources, Governance and Civil War", Central European University, Budapest, 2004, p. 28, WWW: http://www.essex.ac.uk/ecpr/events/jointsessions/paperarchive/uppsala/ws21/Karaev.pdf

[171] WEINTHAL, Erika. **State Making and Environmental Cooperation. Linking Domestic and International Politics in Central Asia**. MIT Press: London, 2002, p. 274

[172] **Agreement Between the Republic of Kazakhstan, the Republic of Kyrgyzstan, the Republic of Uzbekistan, the Republic of Tajikistan and Turkmenistan on Cooperation in the Field of Point Water Resources Management and Conservation of Interstate Sources**. Alma-Ata, February 18, 1992 http://www.cawater-info.net/library/eng/l/ca_cooperation.pdf

[173] For information on the activities of ICWC see e.g. DUKHOVNY, Victor. **ICWC Achievements and Challenges of the Future: Water Cooperation on the Way to Sustainable Development.** Tashkent 2007, p. 39, WWW: http://www.cawater-info.net/library/eng/icwc_future_e.pdf

Orda 1993[174], Nukus 1997, Dashoguz 1999, Dushanbe 2002) illustrated the dedication of the Central Asian countries to cooperate.

The International Fund for Saving the Aral Sea (IFAS) was established as an interstate organization in 1993 and since then works as the main instrument of collective influence on the environmental, social, and economic situation in the region. In January 1994, the Heads of States approved the Aral Sea Basin Program (ASBP-1)[175]. The Syr Darya Agreement of 1998[176], which plays an important role in establishing the cooperation over water management and hydropower organization, which will be looked upon in details later.[177]

Since the Newly Independent States (NIS) lacked an institutional and legal basis for regional cooperation, various external players such as multilateral institutions[178], in particular the World Bank, or direct bilateral development agencies, such as USAID provided incentives for cooperation and institutional building in the form of side-payments, whether financial or technical.[179]

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[174] **Agreement Between Republic of Kazakhstan, Kyrgyz Republic, Republic of Tajikistan, Turkmenistan, and Republic of Uzbekistan on Point Activities in Addressing the Aral Sea and the Zone around the Sea Crisis, Improving the Environment, and Enduring the Social and Economic Development of the Aral Sea Region.** Kyzyl-Orda, March 26, 1993, WWW: http://www.cawater-info.net/library/eng/l/kzyl-orda_agreement.pdf

[175] The main task of ASBP-1 was stabilization of the environmental conditions of the Aral Sea Basin and to tackle socio-economic challenges of the region. In 1996 the second stage ASBP-2 was prepared. Certain hopes are raised with Kazakhstan taking over the Chairmanship of the IFAS, that the ASBP-2 will resume being implemented.

[176] **Agreement between the Governments of the Republic of Kazakhstan, the Kyrgyz Republic, and the Republic of Uzbekistán on the Use of Water and Energy Resources of the Syr Darya basin**, WWW: http://www.cawater-info.net/library/eng/l/syrdarya_water_energy.pdf

[177] For the text analysis of the Intergovernmental Agreements 1992 and 1998 from the perspective of non/compliance studies see: SEHRING, Jenniver. **Wasserpolitik an grenzüberschreitenden Flüssen in Zentralasien**. In: FRANZKE, Jochen (Ed.) **Wasser. Zukunftressource zwischen Menschenrecht und Wirtschaftsgut, Konflikte und Kooperation**. Internationale Probleme und Perspektiven 17. Brandenburgerusche Landzentrale für politische Bildung. Impressum: Potsdam, 2008, p. 85-98

[178] Multilateral institutions: WB, ADB, EC (TACIS), UN (UNDP, UNESCO, UNEP), OSCE, NATO; Direct bilateral cooperation agencies: USAID, SDC, GTZ, CIDA. Also INGOs like World Water Council, Global Water Partnership, Asia-Pacific Water Forum, International Network of Basin Organizations contribute to strengthening of regional collaboration

[179] WEINTHAL (2002), p. 103-171

The Factor of Water in Central Asia is further affected by two phenomena, that we feel need deeper insight, therefore the following two subsections are dedicated to:
(1) Trans-boundary waters in the Newly Independent States and the
(2) Aral Sea Catastrophe

2. 2 Trans-boundary waters in the Newly Independent States

The number of trans-boundary watercourses in the world rose visibly with the dissolution of the Soviet Union. Suddenly, many water allocation and pollution issues that were previously managed as national affairs within one state became international. In the process of transition, the Newly Independent States (NIS), along with state-building and nation-forming processes, started formulating and exercising their hydro-political strategies, priorities and interests. As these different hydro-related national interests meet, new riparian state relations are being formed and new cooperation and conflict situations arise. We are interested, mostly in the political implications of this phenomena and how it manifests itself in Central Asia.

Studying the trans-boundary water interactions in the post-Soviet region is logically a relatively new field of research. Significant efforts have been made by the United Nations Economic Commission for Europe (UNECE)[180] to systemize the existing agreements, regional and global conventions that apply to the NIS region, a specific subset of the UNECE territorial focus area[181]. A clear overview of the NIS trans-boundary water basins and relevant bilateral and multilateral agreements already in force, or on other relevant environmental issues has also been produced by UNECE.[182] Besides, the first ever in-depth report on trans-boundary waters in UNECE

[180] UNECE was set up in 1947 by ECOSOC as one of five regional commissions of the United Nations. Its major aim is to promote pan-European economic integration. UNECE brings together 56 countries located in EU, non-EU Western and Eastern Europe, South-East Europe, Commonwealth of Independent States and North America. The NIS sub-region focuses on 12 following countries: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

[181] UNECE. **Sotrudnichestvo po transgranichnym vodam: Tendentsii v novych nezavisimych gosudarstvach.** Series of publications on water problems, №4. Geneva 2006, 131 p. WWW: http://www.unece.org/env/water/publications/documents/waterseries4_r.pdf

[182] UNECE/UNEP/ECOTERRA. **Trans-bounary Water Cooperation in the Newly Independent States.** Moscow/Geneva, 2003, 58 p. WWW:

region has been produced. This assessment covers 70 trans-boundary aquifers in South-Eastern Europe, Caucasus and Central Asia. The hydrological regime of these water bodies, pressure factors in particular basins, their status and trans-boundary impact, as well as trends, future development and envisaged management measures are summarized and described.[183]

Overall, it can be said, that a new level of negotiated legal and regulatory framework needs to be agreed for the water resources management in the NIS region. Although the rhetoric of cooperation clearly prevails, the practical implementation of the "paper tiger" agreements lags behind.

Within the Soviet Union, some significant trans-boundary water agreements were reached between the USSR as one party, and third states as the other party. As an illustrative example serves the establishment of the Joint Commissions of Armenia and Turkey as well as Georgia and Turkey according to the Turkey-Soviet Agreement of 1927; or the Polish Soviet Agreement of 1964 that established the Joint Commissions between Poland and Belarus, Poland and Lithuania Poland and Russian Federation and Poland and Ukraine. Some of the successfully working agreements have been prolonged after the dissolution of the Soviet Union.[184]

As the development after 1991 is concerned, for example, new agreements were concluded between Russian Federation and Estonia on the Peipsijärvi/Chudskoe Lake in River Narva basin or between Kyrgyzstan and Kazakhstan on the rivers Chu and Talas.[185] The first achievement in the field of multilateral agreements on trans-boundary

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http://www.unece.org/env/water/documents/transbwatcoopnis_fin_r.doc

[183] UNECE. **Our Waters: Joining Hands Across Borders. First Assessment of Transboundary Rivers, Lakes and Groundwaters.** New York/Geneva, 2007, 388 p. WWW: http://www.unece.org/env/water/publications/assessment/assessmentweb_full.pdf

[184] E.g. The Protocol concerning inventory making of legislative background bilateral Russian-Finnish relations, signed July 11, 1992, prolonged some transboundary water agreements.

[185] **Agreement between the Government of the Republic of Kazakhstan and the Government of the Kyrgyz Republic on the Use of Water Management Facilities of Intergovernmental Status on the Rivers Chu and Talas**. WWW: http://www.talaschu.kz/eng/dpk_i_2000.php

waters in the NIS region is the Almaty Agreement of 1992.[186] In Moscow, the CIS Trans-boundary Water Agreement based on provisions of the UNECE Water Convention, between three parties – Belarus, Russian Federation and Tajikistan was signed in 1998 and entered into force on 6 June 2002.[187]

The NIS struggle with an administrative resource problem that is basically common in every sovereign country. This is manifested for example in the lack of specifically trained human resources, to exercise the new tasks on national and regional level that were previously managed from the centre. As for the IWRM, we do not always see the different sectors of production being considered, together with the considering the needs of conserving the ecosystem. There is a lack of dialogue between the different government authorities, dual structures – old and new ones coexist and form inconsistencies, or not enough consideration is give to the informal rules of the particular cultural setting.[188]

In the recently established international water basin, new constellations of upstream and downstream relations arise. In the case of Central Asia, this is connected with different ideas of preferential timing of releasing the water flows, for hydro-electric generation in the winter or irrigational purposes in the summer. In some important international basins, such as the Kura basin (Azerbaijan, Georgia, Armenia, Turkey and Iran) an agreement on reasonable and equitable use of water resources has not been agreed so far and this issue should be addressed with particular interest as soon as possible.

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[186] **Agreement between the Republic of Kazakhstan, the Republic of Kyrgyzstan, the Republic of Uzbekistan, the Republic of Tajikistan and Turkmenistan.** WWW: http://www.cawater-info.net/library/eng/l/ca_cooperation.pdf

[187] **Agreement on General Principles of Interaction in Rational Use and Protection of Trans-boundary Water-bodies of the CIS Member States**

[188] E.g. in the case of Kyrgyzstan as some of the crucial informal institutions that need to be given attention to when implementing the reform of water sector are: Influence of former elites, autocratic leadership and passivity of water users, the notion of water as a gift from God, illegal water abstraction practices. More on this:

HERRFAHRDT-PÄHLE, Elke. **Two Steps Forward, One Step Back. Institutional Change in Kyrgyz Water Governance**. 277-297 p. In: (Ed.) SCHEUMAN, Waltina; NEUBERT, Susanne; KIPPING, Martin. **Water Politics and Development Cooperation. Local Power Plays and Global Governance**. German Development Institute, Berlin: Springer, 2008, p. 416

Problems commonly present in all NIS trans-boundary river basins are lack of information exchange, not enough reliable, available and harmonized data and insufficient monitoring. Another very important point that needs to be raised is the fact, that the river basin organizations generally do not have the mandate to develop an optimal cooperation mechanism. They are more of technical specialization, not dealing with political questions.

Moving on to international law regimes on trans-boundary waters, in one of the subsections of the theoretical part of this thesis, the UN Watercourse Convention of 1997 was carefully examined. Although from the Central Asian countries, three countries, Kazakhstan, Uzbekistan and Tajikistan, have already signed and ratified the UN WWC, the Agreement still needs to be enforced. The UN WWC is generally viewed upon as a good starting point for negotiating regional agreements, because it clarifies the basic universally accepted consensus on governing the international water resources. As for the European approach to surface and groundwater management, the key document is the European Water Framework Directive and from the Central Asian countries, Kazakhstan is showing particular interest in this document, advancing the IWRM approach to national legislation without actually having any legal or political obligation. [189]

But beyond any doubt, for the UNECE region, the most relevant of international water law instrument is the UNECE Water Convention, mainly because since 1996 it actually is in force and currently supported by 36 signatories.[190] The Water Convention prescribes national measures for the protection and environmentally sound management of trans-boundary surface and ground water resources. Further, the Water Convention obligates to prevent, control and reduce water pollution from point and non-point sources. This is why the debate on water quality and whether it can represent region-wide the requirements is taking place. In particular from Central Asian representatives we often hear this concern, that the UNECE Water Convention was developed under

[189] **EU Water Framework** Directive (WFD). Directive 2000/60/EC of the European Parlament and of the Council establishing a framewoek for the Community action in the field of water policy. WWW: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT

[190] **Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Helsinki**, March 17, 1992, WWW: http://www.unece.org/env/water/pdf/watercon.pdf

European conditions, where the water quality is the main challenge, while yet in the Aral region the priority are the allocation issues and questions of water quantity.[191] Further, the Agreement contains provisions for monitoring, research and development, consultations, warning and alarm systems, mutual assistance, exchange of information and establishment of joint bodies.[192] In 2003 the UNECE Water Convention was amended to allow parties outside the UNECE region to become signatories, thus far 10-non UNECE parties have ratified the Convention.[193] In Central Asia, Kazakhstan has ratified the Convention on June 11, 2001 and most recently, Uzbekistan ratified it on September 11, 2007. Remaining other three countries have so far not signed, nor ratified the Convention.[194]

The Protocol on Water and Health of the UNECE Water Convention, which is of particular relevance to the Central Asian region, as it deals with tackling water related diseases, has not been to date ratified in this region, although Kazakhstan, Kyrgyzstan and Tajikistan are taking steps towards it.[195] Nor has the Protocol on Civil Liability, which deals with trans-boundary damage cause by human activities and industrial accidents on international watercourses, and enables for example fishermen to claim the right for compensation.[196]

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[191] Interview with Sonja Koeppel, Associate Expert in Environmental Affairs, Water Convention, UNECE; 5th World Water Forum, Istanbul, March 20, 2009

[192] For a detailed analysis of UNECE Conventions (UNECE EIA Convention, Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters – The Aarus Convention) and SPECA activities in Central Asia see: LIBERT, Bo. **Water Management in Central Asia and the Activities of UNECE**. In: RAHAMAN, Muhammad M.; VARIS, Olli (Ed.). **Central Asian Waters: Social, Economic, Environmental and Governance Puzzle**. Water and Development Publications, University of Technology: Helsinki, 2008, p. 158, WWW:http://www.water.tkk.fi/English/wr/research/global/material/Central_Asian_Waters-book.pdf

[193] **Amendment to Articles 25 and 26 of the UNECE Water Convention:** http://www.unece.org/env/documents/2004/wat/ece.mp.wat.14.e.pdf

[194] Francesca Bernardini, the Secretary of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, UNECE spoke in her speech addressed to the audience of the European Regional Process during the 5th World Water Forum about the applicability of the UNECE Water Convention to the Central Asian region.

[195] **Protocol on Water and Health of the UNECE Water Convention:** http://www.unece.org/env/water/text/text_protocol.htm

[196] **Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters**: http://www.unece.org/env/civil-liability/welcome.html

For Central Asian countries, signing and ratifying international legal instruments, such as the UN Convention is a means to gain recognition and legitimacy. Conventions should be taken as framework guidelines and their practical applicability in particular cultural context needs to be subjected to inquiry. Naturally, not all existing disharmonies will disappear just by the relatively simple act of signing a document.

2. 3 The Aral Sea Catastrophe

The "Aralkum Sea" is the open air museum of remnants of ships in the desert of what once used to be a fish-rich water surface. Actually, the Aralkum is the world's youngest sandy-solonchak desert, formed on the dried bottom of the Aral Sea. This metamorphosis is most vividly illustrated on the world-press type photographs of ship wrecks and camels "ships of the desert", that have been receiving massive attention from the public, as they capture a sense of strange nostalgia and symbolism. Those artefacts offer a similar experience as the organised tourist excursions to Chernobyl. It is not coincidental, that those two immense man-made catastrophes are often compared[197] and mentioned in the same context, in fact, Aral is sometimes referred to as a "quiet Chernobyl"[198]. We claim that it was mainly the Aral Crisis that brought the area of Central Asia into international focus and stirred global interest.

Often the Aral Sea is seen as a symbol of man's ravaging against nature. According to Prof. Nikolay Aladin[199], from the Russian Academy of Sciences, the present desiccation of the Aral Sea is in fact already the third one in the history. He also gives a zoological explanation of why the "eye of the desert" became "blind", saying that the lake has been suffering from invasion of foreign species, not to blame the humans solely. Professor Aladin suggests, that the Aral Sea does no longer exist, it is

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[197] Ed. ONISHI, Yasuo; VOITSEKHOVICH, Oleg V; ZHELEZNYAK, Mark J. **Chernobyl – What Have We Learned? The Successes and Failure to Mitigate Water Contamination over 20 Years.** Dordrecht: Springer, 2007, 289 p.

[198] BILIOURI, Daphne. **The International Response to the Aral Sea**. Eurasianet, December 1, 2000. WWW: http://www.eurasianet.org/departments/environment/articles/eav010600.shtml

[199] Presentation on **Aral and Caspian Sea**, Side Event at the 5th World Water Forum in Istanbul, March 21 2009, organized by International Lake Environment Committee Foundation, Brackish Water Hydrobiology, Zoological Institute, Russian Academy of Sciences

today constituted of set of lakes and local people refer to each of them separately (Kazaral, Wester Uzaral, Eastern Uzaral, Tshebas-Kul, Uzun Aral). However, the more commonly found interpretation of the causes of this environmental tragedy is the depersonalization of future planning and delegation of individual (personal, local, national) responsibility to the centre.

The Springer Verlag has only recently paid a tribute to the Aral by publishing of The Aral Sea Encyclopedia[200], as the first one in the series about the seas of the former Soviet Union. The publication is presented as the monument to the disappearing sea – "one of the most serious anthropogenic environmental crises of the 20th century". In the introduction it is said, that the lake which in the 1960s was a pearl among the sands of the largest deserts, Karakum and Kyzylkum, was lost due to wide-scale irrigational farming in the attempt to establish the cotton independence of the Soviet Union. As the water flow into the Aral diminished, it cause death, salinization, a complete degradation of the historically established ecosystem and caused a socioeconomic crisis. The Aral Sea Encyclopedia offers a summary of the benchmark investigations of Aral, the information about leading international programs and projects and a chronology of historical events for the past 300 years, from Peter I., till present day.[201]

The Aral Sea (Aral Tenizi - translates as Sea of Islands)[202] and can be characterized as an inland drainless saline lake, that is in complete isolation from world's ocean. A. I. Bulatov a circumnavigator and the author of the first Aral map compares the shape of the lake to a "spilled glass of water". The Aral Sea is located between the territory of Kazakhstan and Uzbekistan (Republic of Karakalpakstan). However, researchers warn against the threat of the so called littoral approach, which means that the problems of the Aral Sea concern the entire region, not only Uzbekistan and Kazakhstan. An example of the comprehension of this notion can be given by the

[200] ZONN, Igor. S; GLANTZ, Michael H; KOSTIANOY, Andrey G.; KOSAREV, Aleksey N. **The Aral Sea Encyclopedia**. Springer-Verlag: Berlin , 2009, 298 p. http://www.springerlink.com/content/w6w743/?p=a9e43dfbb6ac487eba633282cd522e16&pi=5

[201] For the first bibliography on the Aral Sea problem see: NIHOUL, J. C. J; KOSAREV, A. N.; KOSTIANOY, A. G.; ZONN, I. S. **The Aral Sea: Selected Bibliography**. Noosphere: Moscow, 2002, 232 p.

[202] Another version is that the name is derived from the Uzbek word "aralashmak", which translates as "to stir or mix " (water is half-salty – mixed).

April 2009 Summit of Heads of States of the five founding members of the International Fund for Saving the Aral Sea in Alma-Ata, that will be looked upon below.

Before the year 1960, the Aral Sea was one of the largest lakes of the world. It is interesting to remark, that from the onset of 20th century until the 1960s the water balance in the lake was constant and relatively stable, with annual inflow of river waters 50-52 cu. km and precipitation falling on the sea (8-10 cu. km), which was compensated with evaporation. The Sea played a significant economic role for the Central Asian republics in Soviet times. It served as the water transport medium, since at those times about 80% of the population was in one way or another connected with fishing, fishing processing and fish delivery to port Aralsk, from where the stocks were transported on by railroad to all parts of the Soviet Union. Another vital function the Aral Sea is the environmental one. The large water reservoir contributed to the air humidity and through the evaporation process practically irrigated the desert.

However, as the areas developed and through irrigational farming were constantly expanding, also the volumes of water withdrawal from the rivers had to be doubled. Since 1961 the water reaching the Sea dropped rapidly and the reduction of the surface and water volumes were evident. This, naturally, also affected the salt balance. The contours of the Aral Sea changed significantly, what used to be an archipelago turned into mainland and where water previously covered land, new islands appeared. By 1980 large bays dried out (Muinak, Sarybas, Adjibai). The sorrowful future for the Aral Sea was already predictable in 1960s. At those times however, the Aral was viewed upon as a large evaporator of water therefore an economic priority would be to divert the water for irrigational purposes, even at the cost of loosing fishery, muskrat rearing and transportation.[203]

The steady drying out of the water surface created a crisis situation of immobilization of ports like Aralsk, Muinak, Urga, Uchsai, Taili, Uyaly and others. Compared to 1950s, the irrigated lands in the 1980s nearly doubled. The land development was conducted in extensive methods, which in practice meant expansion to

[203] ZONN, Igor. S; GLANTZ, Michael H; KOSTIANOY, Andrey G.; KOSAREV, Aleksey N. **The Aral Sea Encyclopedia**. Springer-Verlag: Berlin, 2009, 298 p. WWW: http://www.springerlink.com/content/w6w743/?p=a9e43dfbb6ac487eba633282cd522e16&pi=5

areas remote from river beds and to higher elevations, so that the natural increase of water flow could no longer compensate for water withdrawals. Also the growing water losses, e.g. due to increasing Karakum Canal intakes, or due to the fact that the canals distributing water were old without concrete lining, which added worries to what was already not a desirable situation. Also it is important to mention that water from Syr Darya was frequently released to Arnasay depression (e.g. in the water abundant year 1969 it was as much as 20 cu. km)[204] and water from Amu Darya was released into the Sarykamysh depression, which lowered the amount of water reaching the Aral Sea even more.

Also the regional climatic conditions worsened, with lower air humidity, dry winds and dust storms recorded even from space and lake-marshy complexes being formed. The soil went through processes such as degradation, intoxication, salnization, erosion and compaction.[205] Further unique fish disappeared and the Sea became practically lifeless. As a consequence of the agricultural monoculture the living space was impoverished. The environmental degradation has immense social effects particularly for the Autonomous Republic of Karakalpakstan, such as decreased agricultural production, insufficient supplies of basic goods, harmful effects on human health and large-scale migration of environmental refugees.

Today, the restoration of the Aral Sea seems impossible, mainly because it is not a priority. What can be done however is that with help of water saving, recycling and using technological advancements such as sprinkler and drip irrigation, and by stopping sending the local runoff to Arnasay and Ainarsky depressions, the level drop of the Sea can be stabilized. In the Small Aral, which is the Kazakh part of the lake, there is a success story project implemented. It is namely the Kokaral Dam that was constructed in the narrowest part of Berg Strait and connects the Kokaral Cape with the mainland

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[204] KUDRYASHOV, Andrej. **Budushchee vodoemov Uzbekistana: usychanie Arala priostanovilos', Ajdarkul' perepolnen, v Ferganskoj doline planiruetsya cozdanie novych vodochranilishch**. Ferghana.ru, August, 16, 2004, WWW: http://www.ferghana.ru/article.php?id=3091

[205] KLÖTZLI, Stepan. **The Water and Soil Crisis in Central Asia: a Source for Future Conflicts**. Center for Security Studies: Zurich, 1994, 76 p. WWW: http://www.isn.ethz.ch/isn/Digital-Library/Publications/Detail/?ots591=0C54E3B3-1E9C-BE1E-2C24-A6A8C7060233&lng=en&id=244

near Syr Darya mouth. The idea was shaped in 1992 and constructed with "Stone Age" technology. In 1999 there was a catastrophe that torn down the dike and a decision was passed to build a proper one, financed jointly by the World Bank (65 Million) and Kazakhstan (30 Million). The construction of Kokaral Dam made it possible to stabilize the water level in the Small Aral at 39-42 m. For the future, there are plans to explore the option of elevating the water level to 46m, which would mean that the water would reach to Aralsk City.[206]

The future of the Uzbek part of the Aral Sea seems bleak. Instead of trying to preserve what has been left of the lake, the national priority is to explore the options of extraction of oil at the dried up bottom of the Aral. Already in 2006 an Agreement has been reached between the government of Uzbekistan and a consortium of five investors (Uzbekneftegaz, Russian Lukoil, Malaysian Petronas, Chinese CNPC and Korean KIOS) to start the seismologic investigations.[207] According to the Academy of Sciences of Karakalpakstan, such research will not have negative influence on the environment.

In Autumn 2008 Kazakhstan was elected as the Chairman of the IFAS for 2009-2011. The same year in December, on the 63rd Session of the General Assembly of the United Nations a declaration was passed, which granted IFAS the status of an observer in the GA.[208] The Fond held the Heads of States Summit in April 2009. Leaders of all five Central Asian countries signed a joint statement which contains a provision on the Aral Sea Basin Program 3 (ASBP-3), which according to us is a clear sign of resurgence of the IFAS.[209] On this meeting, Nursultan Nazarbayev enumerated that so far the five countries have invested US$ 2 billion to save the Aral Sea. He emphasized the achievements of reviving the Small Aral in the Kazakh part of the lake and added that more important than attaining the fontal level of the Aral Sea, the primary aim should be

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[206] LILLIS, Joanna. **Kazakhstan: The Northern Aral Sea Rides Wave of Optimism**. Eurasianet, April 29, 2009, WWW: http://www.eurasianet.org/departments/insight/articles/eav042409.shtml

[207] SHULEPINA, Nataliya. **Uzbekistan: Krasnyj treugol'nik na Aral'skom dne**. Ferghana.ru, November 22, 2008, WWW: http://www.ferghana.ru/article.php?id=5963

[208] A/RES/63/133. **Observer status for the International Fund for Saving the Aral Sea in the General Assembly**, WWW: http://daccess-ods.un.org/TMP/3658233.html

[209] **Sovmestnoe zayavlenie glav gosudarstv – uchreditelej Mezhdunarodnogo Fonda Spaseniya Arala (polnyj tekst)**. Fergana.Ru, March 28, 2009. WWW: http://www.ferghana.ru/news.php?id=11815

to purify the water. The reaction of his Uzbek counterpart, Islam Karimov was that saving the Aral Sea is practically impossible, but taking actions to improve the lives of the local population should be the responsibility of the states. As a way to achieve this, he suggested the construction of local water reservoirs.[210]

Since the Aral Sea Crisis is a regional concern, not just a bilateral issue between Uzbekistan and Kazakhstan, also the presidents of the three remaining Central Asian states had their say. Kurmanbek Bakiev tried to turn the debates towards energy questions and also tried to draw the attention to the effects of the global warming on the melting glaciers in Kyrgyzstan.[211] Emomali Rahmon, the Tajik president made sure his amendments to the Joint Statement of the Heads of States concerning water use and construction of new hydropower plants were passed. Also the Turkmen leader, Gurbanguly Berdimuhamedow signed this document and suggested supporting the region with Turkmen gas and electric energy. Besides the multilateral negotiations, a series of bilateral meetings took place. It is interesting to note, that this time Moscow was not invited to join the Summit.

On the point of Russian influence in the regional water politics, let's now devote some attention to the Russian plan to divert Siberian rivers to Central Asia. The diversion of rivers is mentioned in this context, because we feel it perfectly illustrates some of the logic that lead to the desiccation of the Aral Sea in the first place and now is suggested as a solution to tackle the crisis. Namely it is the adherence to supply side[212] management of water resources as well as the much-favored grand megalomaniac solutions to problems. Diverting Siberian rivers basically means, that about 5-7% of the Ob river from the point of confluence with Irtysh river, would be diverted with the intention to provide a new source of irrigation for Russian regions (Omsk, Kurgansk,

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[210] **Kazakhstan: Na summite po spaseniyu Arala lidery stran Tsentral'noj Azii podpisali sovmestnoe zayavlenie**. Fergana.Ru, March 28, 2009. WWW: http://www.ferghana.ru/news.php?id=11813

[211] More on glaciers of Kyrgyzstan e.g. DUDKA, Irina. **Urustem Kabylbekov: Voda mozhet stat' obedinyayushchim faktorom dlya vsej Tsentral'noj Azii**. Ferghana.Ru, June 22, 2008, WWW: http://www.ferghana.ru/article.php?id=5748

[212] Another example of similar kind is the suggestion of „high-tech precipation regulation" that could double the water resources of the region. Read more: KUDRYASHOV, Andrej. **Akademik B. Tashmuchammedov: Upravlyaya osadkami, vodnye resursy Uzbekistana mozhno udvoit'**. Ferghana.Ru, July 7, 2008, WWW: http://www.ferghana.ru/article.php?id=5771

Chelyabunsk, Tyumensk), as well as for Central Asian countries (Kazakhstan, Uzbekistan and Turkmenistan).

This idea is actually not new, for the first time it was suggested in the 18th century by Demchenko[213], and since then it is periodically revived. The mayor of Moscow, Yurij Luzhkov is known to be a strong supporter of the project.[214] Last year he even published a book called "Water and the world" that describes the economic advantages of Russian entrance into the Central Asian region on the "wave of Ob and Irtysh". This book initiated a public debate on this topic. Luzhkov wrote a letter to Putin already in 2002, asking the then President, to take the project of diverting the parts of courses of Siberian rivers under his personal patronage. As a reaction, the Institute of CIS organized in April 2003 a conference named "Russia and Central Asia: Problems of Water and Strategy of Cooperation". A collection of articles from this event has been published and summarizes the tone of the debates that took place.[215]

At the St.Peterburg economic forum mayor Luzkov said, that Russia would profit US$ 4 billion for annually providing 20 cu. km of water. There are several draw-backs of this project. First one is pricing water. Just the idea of water as a good is a new phenomena in Central Asia and it is not always welcome. Professor Dukhovny warns of the danger of new type of oligarchy evolving around the ownership of water and alerts the possible personal ambitions that mayor Luzkov might have. The Kazakhs look critically at this suggestion, because the Irtysh river flows to Russia through Kazakhstan and they do not see the logic behind paying for the river returning back.[216] Second set of argumentation involves ecology. Such a project can entirely change the ecosystem in

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[213] Author of the brochure: **O navodnenii Aralo-Kaspijskoj nizmennosti dlya uluchsheniya klimata prilezhashchikh stran**. (1891) At the times of the publication, the public thought low of this idea

[214] Ferghana.Ru. **Rossiya: Mer Moskvy ne ostavil idei povernut' reki.** January 20, 2009, WWW: http://www.ferghana.ru/article.php?id=11106

[215] GUSEV, B. V. **O Perebroske Sibirskich Rek v Tsentral'nuyu Aziyu**. DUKHOVNY, V. A. **Novye aspekty starych proektov (vozvrashchayas' k voprosu o perebroske stoka sibirskich rek)**. VASILENKO, V. A. **Ostorozhno, snova povorot.** SHIGANOVA, Ol'ga. **Reki perebrosit', nel'zya otkazat'sya ili reki perebrosit' nel'zya, otkazat'sya**. YABLOKOV, A. V. **U Obi net lishnej vody**. See the collection of scholarly articles, WWW: http://www.cawater-info.net/review/siberia_centrasia.htm

[216] YANOVSKAYA, Mariya. **Dmitrij Verkhoturov: "Nazarbaev ispol'zuet sovetskij dovoennyj ekonomicheskij opyt".** Ferghana.Ru, December 12, 2008, WWW: http://www.ferghana.ru/article.php?id=5988

a negative way. For example, British critics fear, that by diverting the flow of Siberian rivers, the inflow into the North Atlantic ocean would change which could cause the freezing of Great Britain.[217] The advocates of the project give an environmental counter-argument, that in fact, only the excess flood causing waters of Ob will be used, that are annually accountable for causing great damage and now will be diverted to stop a humanitarian crisis. Last set of arguments is political. Without political will, no project of this scope can be pursued without the consent of the Central Asian leader and so far none of them have voiced a clear support. Overall it can be concluded, that the geopolitical pretext in the Siberian river project is self-evident.

2. 4 Syr Darya River Basin

The river Syr Darya was in the past referred to as Jaxartes[218] and today is the second largest river in Central Asia in terms of water availability, right after Amu Darya. As the beginning of Syr Darya we consider the confluence of two trans-boundary watercourses, Naryn and Karadarya in the eastern Ferghana Valley. Syr Darya holds the prime of being the longest river of Aral Sea basin, stretching over 2137 km and if we take into account the river length from Naryn all the way to the Aral Sea, it is 3019 km long.

Reckoning the size of the river catchment area is an uneasy task. Some hydrologists estimate the size of the watershed area of Syr Darya being 443 thousand sq. km (32% of Central Asia)[219], while others do not dare to give such assumptions, due to the claim that it is impossible to be accurate taking into account the mountainous terrain. The assumptions differ quite radically, for example according to the data provided by Basin Water Organization (BVO) Syr Darya, the catchment of the river is

[217] SARIMOV, Ajdos. **Voda udarila chinovnikam v golovu?** Ferghana.Ru, July 7, 2008, WWW: http://www.ferghana.ru/article.php?id=5773

[218] Yaksart, Silis (Antique); Seikhun, Djeikhun (Modele Ages Arabian)

[219] ZONN, Igor. S; GLANTZ, Michael H; KOSTIANOY, Andrey G.; KOSAREV, Aleksey N. **The Aral Sea Encyclopedia**. Springer-Verlag: Berlin, 2009, 298 p. WWW: http://www.springerlink.com/content/w6w743/?p=a9e43dfbb6ac487eba633282cd522e16&pi=5

only 150 000 sq. km.[220] Some literature sources quote a basin area up to 782 thousand sq. km and some specialists instead of giving the data for entire basin, state that 142 200 sq. km of the basin is upstream of the spot where the river leaves the Ferghana Valley.[221] There are in fact so many figures that differ greatly, that we start questioning the meaning of measurement of catchment area. This figure however remains important in applying the basin wide principle within the IWRM.

Data on the river flow also depends on the source of information, but generally the figure is somewhere around 38 cu. km annually. In comparison to Amu Darya which has ca. 70 cu. km. Further it is estimated, that 60% of the river flow is formed from the mountain runoff. According to the data from BVO Syr Darya 27.6 cu. km of the annual river flow is "trans-boundary" and 21.1 cu. km of this amount can be, allegedly, operated and allocated by the Interstate Coordination Water Commission (ICWC). It is interesting to add that Syr Darya has a unique water system and as much as 6.7 cu km of return water are feasible for repeated use.[222]

Syr Darya is fed mostly by snow and in a smaller extent by glaciers and rainfall. The flow of the river is the strongest in early year, exactly suitable for irrigational farming. As for the water cycles, in periods of every 3-4 years there is a low water season that lasts for 5-6 years in succession. The high-water period is often seen only in single occurrence. Example of water abundant year is 2003 and in such cases there is a smaller demand for water and therefore it is more difficult to negotiate the annual interstate agreements over the allocation of the resources.

Now we can consider the two main rivers that form Syr Darya when they confluence, Naryn and Karadarya separately. In both of the rivers, Kyrgyzstan is the upstream riparian state and Uzbekistan the downstream riparian. Naryn is created in the Northern Tien Shan mountains and it contains many multipurpose reservoirs that will be

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[220] **Syr Darya River Basin Morphology**: http://www.cawater-info.net/syrdarya/geo_e.htm

[221] UNECE. **Our Waters: Joining Hands Across Borders. First Assessment of Transboundary Rivers, Lakes and Groundwaters.** Economic Commission for Europe, Convention on the Protection and Use of Transboundary Watercourses and International Lakes, UN: Geneva, 2007 , 388 p. WWW: http://www.unece.org/env/water/publications/assessment/assessmentweb_full.pdf

[222] **Syr Darya River Basin Morphology**: http://www.cawater-info.net/syrdarya/geo_e.htm

looked upon later, the largest being Toktogul. Downstream of the Toktogul reservoir the Naryn river becomes totally regulated. As for the Kara Darya river, it is formed by waters collected in the slopes of Ferghana and Altai ridges. Kara Darya became regulated since 1979 when the Andijan reservoir started operating, which had significant impact on the river flow. Other smaller reservoirs situated in the Kara Darya are Teshiktash and Kujgonya. Another water abundant river of the Syr Darya basin, that that needs to be mentioned in this context, is the Chirchik river. Chirchik is formed at the confluence of Chatkal and Pskem, provides water for the Charvak reservoir and downstream of Charvak becomes fully regulated. There are several factories in proximity of Chirchik: Khodjikent asphalt, concrete plant and Electrokholmprom manufactory.

Moving on from the construction blocks of the Syr Darya to the river itself. The river flow is formed in the upper reaches mountainous areas, in the already mentioned sub-basins. In the water-flow area the consumption is minimal and it is the zone of the potential hydro-power resources development. In the mid-channels the Syr Darya runs through the steppe region, passing through settlements, irrigated areas and oases. In the lower reaches, the river flows through the sands of Kyzyl Kum, before it empties into the Small Aral Sea.

Analyzing the flow through political spectacles, from source to mouth, Syr Darya passes through Kyrgyzstan, Tajikistan, Uzbekistan and Kazakhstan. The ratio between the flow generation and withdrawal by country is sharply disproportional. While Kyrgyzstan generates as much as 72% of the flow it uses up only 1% and the opposite case is Uzbekistan, which only generates 16.6% and uses as up as much as 52% of water resources. It is important to mention Kazakhstan, which generates 6.5% and uses up 38%, while Tajikistan is less relevant, generating 2.7% and withdrawing negligible amount of water.[223]

Syr Darya passes through four states and it is also useful to list the particular regions that it crosses. In Uzbekistan it is these six regions: Andijan, Namangan,

[223] GIESE, E.; SEHRING, J.; TROUCHINE, A.: **Zwischenstaatliche Wasserntzungskonflikte in Zentralasien**. Zentrum für internationale Entwicklungs- und Umweltforschung (ZEU); Institut für Geographie: Giessen, 2004, 53 p. WWW: http://www.uni-giessen.de/zeu/Papers/DiscPap%2318.pdf

Ferghana, Tashkent, Jizzak and Syrdarya; in Kazakhstan it is Kyzyl-Orda and South-Kazakhstan and in Tajikistan it is Soghd.

Looking at the linear scheme of the Syr Darya river (Annex 2), we can see clearly depicted how the river passes through different countries and regions; the main tributaries to the river; intakes, outfalls and limits of BVO; the canals, reservoirs and main water objects. Most of the Syr Darya tributaries are diverted for irrigational purposes and therefore do not reach the river. At the left bank it is for example Isfairam, Shakhimardan, Sokh, Isfara, Khodjabakirgan and Aksu and at the right bank Padshata, Kassansai, Gavasai and Chaadaksai. The water management infrastructure of the Syr Darya river is conducted through 13 reservoirs with common capacity of 35 cu. km and operational capacity of 27 cu. km. Syr Darya river is regulated almost full, about 70%. The most important reservoirs are Toktogul (total capacity 19.5 cu. km; effective capacity 14 cu. km), Charvak (2. 05 cu. km; 1. 6 cu. km) and Andijan (1. 9 cu. km; 1. 75 cu. km) and in-channels for seasonal regulation Kayrakkum (4. 03 cu. km; 2. 55 cu. km) and Chardara reservoir (5.4 cu. km; 4.4 cu. km).[224]

The Basin Water Organization (BVO) Syrdarya[225] is responsible for trans-boundary water resource management and interstate water allocation from Toktogul reservoir to the border of Kazakhstan, at the Chardara reservoir. It was created pursuant to the resolution of the October 1985 Plenum of Communist Party of Soviet Union Central Committee and the USSR Government and orders of USSR Ministry of Water Management as a basin department (together with BVO Amu Darya) on inter-republican water allocation. The administrative centre of the Organization is located in Tashkent. Together with the Committees for the Environment, Hydro-meteorological Services and Sanitary Inspections of the states of the ICWC, the BVO Syr Darya is also responsible for control of water quality in the basin.

Altogether there are 196 hydraulic structures located on the Syr Darya river, 225 channels of interstate significance, 190 gauging stations and 9 hydropower plans (total

[224] **Water Management Infrastructure of the Syr Darya River Basin**: http://www.cawater-info.net/syrdarya/watermanage_e.htm

[225] **Basin Water Organization Syr Darya**: http://www.icwc-aral.uz/bwosyr.htm

capacity 3. 72 mln KW).[226] In lines with the IWRM, the river is used for multiple purposes, from irrigation (92%), power generation, water supply, control of floods, recreation, fishing and environmental releases. The amount of Syr Darya used for drinking and municipal purposes is 4% and 2% are used for industrial and technical needs.

Just shortly, we will now introduce the riparian states of the Syr Darya basin. The mountainous Kyrgyzstan has a substantial hydropower potential that covers as much as 80% of domestic energy needs. Besides, the hydropower exports, in the form of barter with other Central Asian republics and the Russian Federation, account to 10% of total export, which expressed in monetary terms for year 2001 meant US$46.8 million. The most important economic activity in the agriculture dominated Uzbek economy is the irrigated cotton production. Agriculture altogether constitutes 33% of the Uzbek GDP and 45% of employment. The given figures are for the whole of Uzbekistan, not only the Syr Darya basin. Uzbekistan is the world's second largest cotton exporter, cotton exports amounting to 10% of the total market share. In 2002, the earnings from cotton grew to US$669 million, forming 26.7% of the total Uzbek exports and 60% of hard-currency earnings. For the oil dominated Kazakh economy, the economic significance of the Syr Darya is comparably lower than in the other countries. Agriculture accounts to 11% of the Kazakh GDP and employs 14% of the population. Cotton production plays an important regional role. Specially, for the South-Kazakh province, that exports cotton, in year 2002 this constituting 1% of total export, financially US$104.6.[227]

In arid areas, such as Central Asia, cultivation of agricultural crops, such as cotton, wheat, fruits and vegetables would be impossible without irrigation. Although irrigation is practiced for over 2000 years in this region, only during the times of the

[226] ZONN, Igor. S; GLANTZ, Michael H; KOSTIANOY, Andrey G.; KOSAREV, Aleksey N. **The Aral Sea Encyclopedia**. Springer-Verlag: Berlin, 2009, 298 p. WWW: http://www.springerlink.com/content/w6w743/?p=a9e43dfbb6ac487eba633282cd522e16&pi=5

[227] ABBINK, Klaus; MOLLER, Lars Ch.; O'Hara Sarah. **The Syr Darya River Conflict: An Experimental Case Study.** The Centre for Decision Research and Experimental Economics, School of Economics, University of Nottingham, Disussion Papers, № 14, 2005, p. 31 http://www.risktoleranceonline.com/riskattitude/infos2006/abbink.pdf http://www.nottingham.ac.uk/economics/cedex/papers/2005-14.pdf

Soviet rule, the diversion of water became too extensive, by 1960s quantifying to 30 Billion cu. m (BCM). Reservoirs and dams for diversion and storage, canals and pumping stations were constructed with the main objective to maximize the area under irrigated crop. It needs to be added, that till present days, the irrigation in Central Asia is highly inefficient, only 21% of the water resources are effectively used and as much as 79% are lost mostly due to unlined on-farm canals.

Another heritage from the Soviet era is the interconnected electricity grid, enabling exchange and synchronous operation for the Central Asian countries. The central dispatch is handled from Tashkent by the Unified Dispatch Centre called Energia. Uzbekistan generates 52% of the total electricity, Tajikistan 16%, Kyrgyzstan 15% (79.5% comes from hydropower), Turkmenistan 11% and South Kazakhstan 6%.[228]

There are two significant issues that need to be raised at this point. First one concerns the possible incongruity between the roles assigned to the riparian states during Soviet times with the ideas that the independent states pursue today. Here the tension arises between the "pro status quo" states (Uzbekistan and Turkmenistan) and the "revisionist" states (Kyrgyzstan and Tajikistan).[229] Second issue is the problem of trust. Riparian states are involved in a reciprocity trust-game. As we will see in the case of Toktogul, the theory of games does not necessarily comply with the practice exercised in Central Asia.

2. 4. 1 Toktogul

The Toktogul reservoir was constructed in 1970s as a part of the Naryn cascade, as a multi-year, multi-purpose reservoir. At the time of the construction, the primary intention was event out the inter-annual variations of the river flow, to maximize the irrigation potential of lands under cotton, wheat, rice, fodder, fruits and vegetables.

[228] World Bank. **Water Energy Nexus in Central Asia. Improving Regional Cooperation in the Syr Darya Basin.** Europe and Central Asia Region, The World Bank: Washington DC, 2004, p. 59. WWW: http://siteresources.worldbank.org/INTUZBEKISTAN/Resources/Water_Energy_Nexus_final.pdf

[229] HORSMAN, Stuart. **Water in Central Asia: Regional Cooperation or Conflict?** In: ALLISON, Roy; JONSON, Lena (Ed.) **Central Asian Security: The New International Context**. Brookings Institution Press: Washington D.C, 2001, 279 p.

Therefore the main objective can be described as the intention to increase regional economic specialization in cotton manufacturing. As a result of the construction of the Toktogul reservoir, it was possible to win 480 000 ha of new irrigational lands.

Some technical data, to kick off with, the reservoir area is 284.3 sq. km and the length of the reservoir is 65km, height of the reinforced concrete dam is 215m and installed capacity of hydropower 1.2 M kW.[230] The collective capacity of the Naryn cascade of five reservoirs is 2870 MW. The Toktogul reservoir can operate in two regimes, summer and winter. Summer means basically the vegetation period and in Central Asia it takes from about April to September and winter, if not stated differently, generally means the period from October to March.

Under the Protocol № 413 of 1984 of the Soviet government, it was decided, that during a normal year, when no extraordinary water situation is expected, the discharge from Toktogul reservoir in summer will form 75% of the annual discharge. Therefore, the winter releases should not exceed the remaining 25%, at 180 cu. m/s. This document also determined the percentage allocation of the 22. 7 BCM per Republic, with consequently, Uzbekistan having the right to use 46%, Kazakhstan 44%, Tajikistan 8% and Kyrgyzstan 2%[231].

As a relic of this Protocol, we can look at the barter agreements that were negotiated for fuel and water resources, bilaterally or trilaterally, when Kyrgyzstan supplied Kazakhstan and Uzbekistan with water in vegetation period and was compensated with coal, gas and oil in the non-vegetation period. Those barter agreements recognise the need for issue-linkage, the nexus between energy and water, in order to achieve a regionally acceptable solution.[232] [233] However, after the

[230] **Basin Water Organization Syr Darya**: http://www.icwc-aral.uz/bwosyr.htm

[231] World Bank (2004), p. 5, 15

[232] On barter agreements: ICG: **Central Asia: Water and Conflict.** Asia Report N 34, Osh/Brussels, 2002, 39 p., WWW: http://www.reliefweb.int/library/documents/2002/icg-uzb-30may.pdf [11.12.2008]

[233] On the link between energy and water: DUKHOVNY, V. A. **Voda ili Energiya. Vmeste ili vroz'?** CAREWIB, (ICWC SIC, SDC), N. 5, 8 p. WWW: http://www.cawater-info.net/library/rus/carewib/08_water_and_energy.pdf

independence, this notion found itself under strain and such a perception was no longer the only viable interpretation.

In particular Uzbekistan, often doubts such an approach. The rationale behind can be explained as follows. The energy rich country began formulating its energy development strategy, bearing in mind the ultimate goal of achieving self-sufficiency above all, not considering the interest of neighbouring countries to develop as well. So the Uzbek government adopted steps towards receiving world market prices for the energy exports to Kyrgyzstan.[234] Similarly, it was in the case of Kazakhstan that had no choice but to privatize the energy sector and than consequently receive world prices for payments, without preferential treatment of Kyrgyzstan.

Thus, Kyrgyzstan not having the hard currency to pay with, nor the fossil fuel resources to satisfy domestic energy demands, had to pursue an alternative approach. The operational regime of Toktogul was adapted, favouring the option of releasing discharges in winter to produce hydropower at the time when it was mostly needed. This move was periodically not welcomed by the riparian states, in particular Uzbekistan and Kazakhstan that suffered on one hand of lack of irrigational water in vegetation period and on the other hand overflow in winter, when in the lower reaches of Syr Darya the waterways and canals froze. Unable to handle the huge rising amount of winter releases, Uzbekistan was forced to divert the water into a series of depressions in Arnasay valley, that were later known under the name lake Aydarkul. Annually, the volumes reached 3-9 BCM, which had adverse environmental effects, such as that these waters never reached the shores of the Aral Sea.

Quantifying the change of operational regime, in the decade of 1990-2000, the summer releases declined to 45% and the winter releases increased to 55%. In volumetric entry, this means that in the Toktogul winter-energy regime, 6-8.5 cu. km of water are released instead of 2.5 cu. km that would flow naturally without the existence of the reservoir, which means that the natural indicator is exceeded about tree times. As for the summer-irrigation, 4.5 – 6.5 cu. km is released, instead of the 9 – 11 cu. km that

[234] The change was not as sudden as is sometimes argued. For a long time Kyrgyzstan was treated by Uzbekistan in a preferential manner. Only last year, the prices for gas rapidly (160USD/1000 cu. m).

would flow naturally.[235] The biggest change was, that irrigation was no longer the sole decisive criteria of how much water would be released from Toktogul and when.

The major drawback of the 1992 Almaty Agreement, that needs to be mentioned in this context, was that it could not appropriately asses the increasing power orientation of Toktogul. This lead to a situation that the water level of the reservoir reached such low levels, that in the year 1998 it was almost at a dead storage of 5.5 BCM. The Agreement also lacked effective conflict resolution mechanisms, no provisions were made if disputes took place. Basically since 1994, the water regime at the Syr Darya has been the subject of negotiation between the governments of the Central Asian countries.[236] The expert groups representing equally all the states have drawn together a complex plan of water and energy use in the basin based on two principles of mutual compensation: (1) electricity generated at the Naryn cascade that exceeds the national needs of Kyrgyzstan shall be purchased equally by Uzbekistan and Kazakhstan; (2) compensation to Kyrgyzstan shall be made by equivalent supply of coal and gas in the winter.[237]

Erika Weitnhal, reputable authority in Central Asian water issues claims, that the development agency of the United States of America (USAID) was the first to realise the need to link the issues of water and energy in the Syr Darya basin together. Instead of working with the entrenched water nomenclatura from the downstream states, they began to promote an international institution in which Kyrgyzstan featured as a prominent player – the Interstate Council of Kazakhstan, Kyrgyzstan and Uzbekistan with a Water and Energy Uses Roundtable working group.[238] The intended novelty that

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[235] ELISEEV Yurij. **Raspredelenie vodnych resursov regiona trebuet podpisaniya mnogostronnego mezhstranogo soglashenijya**. Ferghana.Ru, July 27, 2008, WWW: http://www.ferghana.ru/article.php?id=5796

[236] On a thorough analysis of the protocols and agreements from a Kyrgyz perspective see: SHALPYKOVA, Gulnara. **Water Disputes in Central Asia: The Syr Darya River Basin.** Master Thesis, International University of Japan, 2002. CA&CA Press, WWW: http://www.ca-c.org/dataeng/00.shalpykova.shtml

[237] UNECE/ESCAP, SPECA. **Strengthening Cooperation for Rational and Efficient Use of Water and Energy Resources in Central Asia**. United Nations: New York, 2004, p. 110, WWW: http://www.unescap.org/publications/detail.asp?id=1057

[238] WEINTHAL, Erika. **Water Conflict and Cooperation in Central Asia**. Human Development Report 2006 Office Occ.Paper 2006/32, p. 36 WWW: http://hdr.undp.org/en/reports/global/hdr2006/papers/Weinthal%20Erika.pdf [20.5.2007]

the USAID wanted to bring to the impasse of annually repeating difficulties to negotiate barter exchange was the so called "issue linkage". This technique creates the option of increasing the trade-offs and mutual "benefit sharing". The tangible result of these efforts was, allegedly, the 1998 Agreement[239]. This Agreement recognized that Kyrgyzstan wanted to exploit the upper watershed for hydroelectricity production and took into account the interest of Uzbekistan and Kazakhstan to remain constant and sufficient deliveries of water for the irrigational purposes.

The Framework Agreement of 1998, in comparison to earlier programs focused on the Syr Darya basin only, which meant that Turkmenistan, a rather complicated bargaining partner, was left out of the format. Further, the Agreement explicitly recognised that annual and multi-year irrigation water storage is a service, has a cost and it needs to be compensated through a barter exchange of electricity and fossil fuels in cash. However, the application was rather unsatisfactory. Again, in the year 2002 the Toktogul reservoir reached such a low level (7.5 BCM), that the multi-year regulating ability eroded. The compensation was not implemented and even if an annual agreement was reached between the states, the quality of the provided resources was not sufficient. The World Bank estimated that if the riparian states adhere to the irrigational regime of the Toktofgul reservoir, the payment for this service to Kyrgyzstan should be between US$35.1-67.3 million.

In practice, in 2001 the agreed sum was US$48 million, but the actual payment only constituted US$29 million, from which US$20 million are fixed, represented in the Kyrgyz consumption of gas and the rest remaining as variable. In designing the payments providing the service of storing water it is important to consider the dry and wet years and also to divide the fixed and variable charges, to achieve a more equitable sharing and for the mitigation of the risks. Such experience has been established in the Chu-Talas basin, shared between Kyrgyzstan and Kazakhstan, but even here, what

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[239] **Agreement Between the Government of the Republic of Kazakhstan, the Government of the Kyrgyz Republic and the Government of the Republic of Uzbekistan on Joint and Complex Use of Water and Energy Resources of the Syr Darya Basin.** http://www.ce.utexas.edu/prof/mckinney/papers/aral/agreements/SyrDaryaAgr-Mar17-98.pdf

seemed like an ideal that could be applied to other similar basins, shows to have flows when we analyse the compliance to the agreed mechanisms in practice.[240]

Analyzing the benefits of a cooperative situation between the co-riparian states of the Syr Darya basin is complicated by the fact that every participant of the cooperation benefits unequally. The individual national gains for every involved actor are highly asymmetrical. Therefore, the interest of a riparian state to involve into cooperation in a genuine way differs. In the Syr Darya basin this general tendency is even strengthened by the relevance of the timing of when the agreements are reached. For example, for Uzbekistan, there is a high motivation to reach an agreement on the water allocation in a water poor year, before the vegetation period starts, so that enough water would be provided for the downstream irrigated fields. In a situation, when there is a signal from the state hydrological station, that the coming year will be water rich, the Uzbek interest in reaching an agreement is automatically lower. This is perhaps the main systematic flaw of the entire mechanism of negotiations. If agreements were negotiated for example in winter months, the expected amount of precipitation would be an unknown variable. However, the concept of "hydro-solidarity" sounds nice, but it does not have much resonance in Central Asian reality.[241]

From the perspective of the upstream Kyrgyzstan, when negotiating a yearly barter agreement with the downstream riparian countries, the primary interest is to achieve national energy security and if the region wide cooperation helps to achieve this goal, it is perceived as desirable. However, when the agreement is negotiated in the vegetation period, Kyrgyzstan has no guarantees that the gas deliveries in winter will be provided, and also it often happens that the high content of water in the gas causes the flow in the pipelines to freeze and clot.

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[240] On the experience of Chu and Talas e.g.: WEGERICH, Kai. **Passing over the Conflict. The Chu Talas Basin Agreement as a Model for Central Asia**. Wageningen University. In: RAHAMAN, Muhammad M.; VARIS, Olli (Ed.). **Central Asian Waters: Social, Economic, Environmental and Governance Puzzle**. Water and Development Publications. Helsinki University of Technology. 2008, 158 p. WWW: http://www.water.tkk.fi/English/wr/research/global/material/Central_Asian_Waters-book.pdf

[241] Interview with Vadim Sokolov, Deputy Director of SIC ICWC, 5th World Water Forum, Istanbul, March 19, 2009

This is called a trust-game when player A invests first without the guarantee, that player B will also invest, in order to achieve a higher future outcome of both players.[242] If the bilateral deals were negotiated in winter and would not concentrate solely on the water-side, but also address the quality of the gas in return, Kyrgyzstan would have a greater motivation to fulfill the stated limits. Under the present circumstances, it tries to protect its energy security and therefore releases the water-flows in winter months, when it causes damage to the Uzbek harvest by floods. Uzbekistan has even considered the option of taking this matter to the International Court of Justice to ask Kyrgyzstan to compensate it for the damages. In the barter agreements are breached by both parties which does not contribute to the enhancement of the bilateral relations.

Darya Pushkina[243] gives some examples of interstate disputes related to water in the Syr Darya basin. In June 1997, when Uzbekistan cut off 70 percent of flow downstream, threatening 100 000 hectares this prompted a riot by Kazakh farmers. A month later, Uzbekistan deployed 130 000 troops on the Kyrgyzstan border to guard reservoirs straddling two countries. In July Kazakhs staged a protest near the Uzbek border to demand that the Uzbek officials restore the previously-promised water flow. In December the Prime Ministers of Kazakhstan and Kyrgyzstan signed an agreement in Bishkek "to eliminate disagreements over water and energy" As a result, Kyrgyzstan was to provide a sufficient amount of irrigation water in spring and Kazakhstan agreed to contribute to the operation costs of the Kyrgyzstan hydro-power complex. The water deliveries are however often delayed, just as the coal from Kazakhstan. In the same year, Tashkent cut repeatedly the gas deliveries to Kyrgyzstan, because of its mounting debt.

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[242] On theory of the cooperative game theory see e.g. : PARRACHINO, Irene; DINAR, Ariel; FIORAVANTE, Patrone. **Cooperatiove game theory and its application to natural, environmental, and water resources issues: 3. application to water resources**. World Bank. Policy Research Working Paper, № WPS 4047, 2006. p. 46, WWW: http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2006/11/21/000016406_20061121155643/Rendered/INDEX/wps4074.txt

[243] PUSHKINA, Darya. **Cooperation or Conflict - Water in Central Asia**. International Studies Association, California, 2006. 21 p. WWW: http://www.allacademic.com//meta/p_mla_apa_research_citation/0/9/8/5/1/pages98511/p98511-2.php

A tripartite dispute emerged in July 2000 between Kazakhstan, Uzbekistan and Kyrgyzstan emerged. Southern Kazakhstan faced serious water shortages, after the countries failure to meet agreed energy supplies and Bishkek limited the water flow, while Uzbekistan reportedly abstracted more water then it was entitled to. Kazakhstan lobbied for more water. The tensions related to management of water from the Toktogul reservoir have strained the relations between Uzbekistan, Kazakhstan and Kyrgyzstan to the point, that Kyrgyz troops were deployed in summer 2000 and 2001 (drought years) to protect the reservoir and water release operations.[244]

In year 2002 Kyrgyzstan was accused of ignoring the terms of water management agreement with the other Syr Darya countries, releasing too much in the winter and too little in the summer. Consequently, Kazakhstan withdrew from the regional energy system and halved electricity supplies to the Kyrgyz side. As a result, Kyrgyzstan suffered a real energy crisis: scheduled power cuts for domestic users and enterprises were introduced even in Bishkek and Kyrgyz authorities issued a demanding ultimatum to Kazakhstan to restore the previous conditions.[245]

For a better illustration we will now look at a water-rich (2003/04) and a water-poor (2007/08) year, to see how the regional cooperation and conflict evolve, depending on this variable. In the year 2003/04 the riparian states of the Syr Darya basin failed to conclude an annual agreement, because the high anticipated rainfall rate lowered the demand for water and thereby the downstream countries lacked the stimuli to cooperate.[246] As a result, Kyrgyzstan suffering an energy deficit had to release extra water in winter, and these excessive water discharges put the Chardara reservoir at the Uzbek-Kazakh border in danger of overflow and possible destroying of this dam. The Chardara reservoir received 1350 cu. m/s of water. To avoid over-flow, or even bursting

[244] ENVSEC Initiative. **Environment and Security Initiative: Transforming Risks into Co-operation. Central Asia. Ferghana/Osh/Khudjand Area**. Background Paper. UNDP: Bratislava, 2005, 56 p. WWW: http://www.grida.no/_res/site/file/publications/envsec/ferghana-report-eng.pdf

[245] PUSHKINA (2006), p. 12

[246] For a detailed destcription of the crisis management of early 2004 and how these were reported in the Central Asian periodicals see e.g.: RFERL. **Test of Regional Cooperation as Syr Darya Overflows**. Central Asia Report: February 16, 2004, Volume 4, Number 7, WWW: http://www.rferl.org/content/article/1342152.html

of the reservoir, the flow had to be over 700 cu. m/s, which is about double of the normal rate. This however led to floods at the lower reaches of Syr-Darya. [247]

Moving on to the description of the crises management cooperation of the stake-holding states, it was characterized by mutual blaming, lack of trust and further non-compliance with the agreements. In January 2004 an alliance met with the goal of reaching the lowering of the flow generation. Kazakhstan promised to provide coal and fuel to Kyrgyzstan, in return for lowering of flow at the Toktogul from 650m3/s to 500 cu. m/s. Uzbekistan promised to let trough 650 cu. m/s of Syr-Darya water to Arnasay basin and water was also to be used for desalinization of soils of the irrigated fields of Uzbekistan and Kazakhstan. Tajikistan joined this format of talks later, offering the option of using the Kayrakum reservoir in the Sughd Oblast to ease the tension.[248] As for the implementation of the agreed, although Kazakhstan delivered the energy supplies (worth US$ 1.4 million), the other actors, Uzbekistan and Kyrgyzstan did not abide to their duties.[249] Because of the constantly rising flow to 1300-1400m3/s the Kazakh enterprises had no choice but to release further water and this led to floods. In mid February 300 houses were flooded at the area of 590 sq. km, two bridges and some ditches. About 2000 people had to be evacuated.[250]

The representatives of the riparian states of the Syr Darya basin met repeatedly and negotiated in a tense atmosphere, blaming one another for being responsible for the crisis. On the other hand, there was a four-party agreement that emerged form these talks and it was contained in a protocol. Kyrgyzstan pledged to keep discharges from Toktogul at 500 cu. m/s; Uzbekistan agreed to take 450 cu.m/s of water into Arnasay; Kazakhstan said it would continue discharging water from Chardara into the Syr Darya at a rate of 700 cu. m/s and Tajikistan agreed to immediately reduce its own dischareges

[247] In case of the breaking of the Chardara reservoir, with full capacity of 5.2 BCM and level of water 4.5 BCM, this would mean an emergency situation. According to catastrophic prognosis, all settlements in the proximity of 100 km around the reservoir would be wiped out and 65 000 ha of irrigated land would be lost. Therefore, even though in the case of releasing water to Syr Darya and the inevitable freezing and floods, this seemed like a favourable option for Kazakhstan.

[248] However, instead of helping to ease the tension, Tajikistan was contributing to the crisis by actually discharging large additional amounts of water for their own hydroelectric purposes.

[249] On January 29, 2004 the Kazakh Mazhilis (lower house of parliament) issued an appeal to the presidents and parliaments of Kyrgyzstan and Kazakhstan to help to save the Chardara reservoir.

[250] GIESE, et. al (2004), p 4-10

from Kayrakum reservoir. Participants of the quadrilateral talks largely declared, that they were satisfied with the outcome of the negotiations, evidently, tensions still persisted and "full mutual understanding has not been reached". To confirm this claim, we give the evidence of the extraordinary step taken by the Uzbek President Islam Karimov, who wrote an open letter to his Kazakh counterpart Nursultan Nazarbaev, in which we blames Kyrgyzstan for the current situation.

In fact, a similar situation repeated in the year 2008. Unlike the previously described case, this was a water poor year for every riparian state in the Syr Darya basin. The water level at the Toktogul reservoir reached recorded low rates.[251] Regardless, little success was achieved when trying to negotiate a quadrilateral water allocation agreement. As far as the bilateral agreements are concerned, Uzbekistan and Kyrgyzstan failed to reach consent over the price and volume of fuel for water. As a counter-reaction Kyrgyzstan was allegedly not letting water through in May, not sustaining even the minimal volumes needed for the preservation of the ecosystem.[252] In July 2008, Kyrgyzstan and Kazakhstan reached a bilateral electricity agreement, for summer electricity provided by Kyrgyzstan for 5c/kW and binding it with providing 150 cu. m/s more water from Toktogul to Kazakhstan for irrigation. A similar agreement between Kazakhstan and Uzbekistan was discussed, so that Uzbekistan would allow the transit of 600 million cu. m of water from Kyrgyz Toktogul to further downstream located Kazakhstan without any barriers and resource capture. This was particularly important for the South-Kazakh province, because water flow increase from Kyrgyzstan, could not otherwise be felt in Dostyk canal, the only irrigational source for local cotton[253]. In mid-July a series of meetings were held to encourage the adherence of the bilateral agreements.[254]

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[251] SHARIPZHAN, Merhat. **In Central Asia, Water Could Lead to Fire**. RFERL, July 23, 2008 WWW: http://www.rferl.org/content/Commentary_Water_Crisis_Central_Asia/1185586.html

[252] Ferghana.Ru. Interview with Vadim Sokolov: **Vodnye Problemy Voznikayut iz-za „Nesootvenstvya Interesov Verchovij i Nizovij"**. July, 15 2008, WWW: http://www.ferghana.ru/article.php?id=5782

[253] 110 000 ha which is about 2/3 of all Kazakh cotton

[254] For details see: ELISEEV Yurij. **Raspredelenie vodnych resursov regiona trebuet podpisaniya mnogostronnego mezhstranogo soglashenijya**. Ferghana.Ru, July 27, 2008, WWW: http://www.ferghana.ru/article.php?id=5796

On July 18, the Kazakh Deputy Prime Minister Omirzak Shueev sent an official telegram[255] to his Uzbek counterpart Rustam Azimov, urging him in almost an ultimatum to take steps to regulate the flow of water from Kyrgyzstan to Kazakhstan, via Uzbekistan. This letter was published in Kazakh media and used harsh language to express that if Tajikistan and Uzbekistan do not assure the flow-through of 85 cu. m/s of water to Dostyk canal, Kazakhstan will stop to buy the over-priced Kyrgyz hydro-energy produced electricity, and the latter will stop the flow of Toktogul water, which would mean a serious loss for both Uzbekistan and Tajikistan. Anatolij Rjabcev, the Director of Committee of Water Resources at the Ministry of Agriculture of Kazakhstan informed that Uzbekistan took the telegram seriously and water flow to Dostyk rose to 75 cu. m/s the same day of the issuance. The missing amount was to be solved bilaterally with Tajikistan, which would be uneasy, as the Kayrakum reservoir had minimal reserves and the pumping device were unable to let the water flow further.

The lesson learned from the 2008 July experience is, that there is a need to sign a quadrilateral agreement, since the last one was enacted 10 years ago and needs to be reviewed. This regional water-energy agreement should set the quotas and rights and responsibilities of every riparian state. In fact, on the Ferghana.Ru portal, there was a thread of published articles, reacting one to another, from Central Asian authors, presenting mainly the contrasting Uzbek[256] and Kyrgyz[257] perspective on the regional cooperation issues. On the other hand, Kazakhstan seems to be most open for dialogue.[258] Just linking the theory of the trust-game with the Central Asian practice illustrated by the Toktogul case in two water years, one water-abundant (2003/04) and

[255] For the text of the telegram see: Ferghana.Ru. **Kazakhstan proigrozil Uzbekistanu sankciyami za nevypolnenye objazatelstv po tranzitu vody**. July 21, 2008, WWW: http://www.ferghana.ru/news.php?id=9701&mode=snews

[256] CHAMRAYEV, Shavkat. **Problema Mezhdunarodnogo Sotrudnichestva v Bassejne Rek Naryn-Syrdaryja**. Pravda Vostoka, July 28, 2008, WWW: http://www.pv.uz/?inc=5&snd=3&news=4695

[257] Ferghana.Ru. **Kirgizskie energetiki parirovali obvinenija uzbeckych kolleg**. July 30, 2008, http://www.ferghana.ru/article.php?id=5798

[258] GROZIN, Andrey. **Mirovoj krizis otodvinul reshenie vodnogo voprosa v Tsentral'noj Azii.** Institute of Commonwealth of Independent States: Moscow, February 6, 2009. WWW: http://www.materik.ru/rubric/detail.php?ID=3323

one water-poor (2007/08) the nuances of interdependence were well illustrated, and the fact, that often techniques of threatening and ultimatum are perhaps more effective than the concept of benefit-sharing, hydro-solidarity or hydro-diplomacy.

2. 4. 2 Kambarata

As was mentioned before, some states of the Syr Darya basin are satisfied with the roles assigned to them during the Soviet Union, while others are not. Kyrgyzstan in particular, wants to enhance its' hydropower potential, to achieve energy security. The long-term structural option to approach this goal is the construction of additional storage hydroelectric projects, such as Kambarata I. and Kambarata II. These hydropower plants gained renewed interest during the energy crisis in winter 2007/08. Constructing Kambarata would mean that Kyrgyzstan could increase winter electricity production without having to change the winter outflow to the downstream river. There are plans to expand the utilization of the hydropower potential in Kyrgyzstan by 2745 MW by the year 2030 and the estimated investments of foreign capital for this expansion are US$1500 million.[259]

During the Fifth World Water Forum in Istanbul, in March 2009, the Prime Minister of the Kyrgyz Republic Igor Chudinov took the floor and expressed that "construction of the Kambarata hydropower stations, which are located atop the Toktogul water reservoir, has been started yet in the period of former Soviet Union and had gone through examination of the interests of all then the Central Asian republics". It is logical, however, that a project that is 30 years old needs to be the subject of independent examination in contemporary conditions, with paying particular attention to the influence of the construction for the ecological balance of the region and also consideration of emergencies and calamities.[260]

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[259] TROUCHINE, Alexei; GIESE, Ernst. **Aktuelle Probleme der Energiewirtschaft und Energiepolitik in Zentralasien**. Nr. 28, Zentrum für Internationale Entwicklungs- und Umweltforschung der Justus-Liebig-Universität Giessen: Giessen, 2006, p. 50. http://www.uni-giessen.de/cms/faculties/research-centers/zeu-en/forschung/publications/discussion-papers/28-aktuelle-probleme-der-energiewirtschaft-und-energiepolitik-in-zentralasien

[260] ZHIGAREV, S. **Problems Concerning Construction of the Kambarata Hydropower Station-1 in Kyrgyzstan.** PR-inside com, April 2, 2009, WWW: http://www.pr-inside.com/problems-concerning-construction-of-r1160135.htm

The estimated costs of the Kambarata I (1900 MWt) are US$ 2100-2200 million and of Kambarata II (360 MWt) are US$ 400 million. Construction should take about 8-10 years. In winter months it is anticipated, that the Kambarata hydropower stations would produce 2.2 billion kW/h and the surplus (3.5 – 4 billion kW/h) could be sold to China, Russia or Central Asian countries.[261] Satisfying domestic electricity demand is however the priority number one, only thereafter export will be considered.

As with any other large hydro-complex, the neighboring countries might fear that the construction of Kambarata will change the flow of the Naryn, or Syr Darya rivers that would negatively impact their national interests. It is therefore essential, that when investors will assess whether to involve in financing of the Kambarata project, they will approach the construction as an integral part of the Naryn cascade. Only coordinated operation of the cascade can bring the downstream riparian states benefits. It is clear, that domestic financing alone is insufficient, as the costs of construction constitute approximately 77% of the Kyrgyz GNI. External resources are welcome and vital. The World Bank, or a regional development bank will, according to customary rules and procedures, automatically consult all the involved riparian states and effected countries, whether the construction fulfills the "no harm" obligation. In case that a country raises a justified objection, the construction will be either rejected, or an amendment will be agreed, that would mitigate the negative impact.

Besides the enormous direct monetary costs, we should also address the hidden costs of constructing Kambarata, such as the possible need to resettle and displace people. For example when Toktogul was constructed, the indirect costs were considerable - in the Ketman-Tjubinsk valley 24 villages and farms of 21 thousand ha (12.5 thousand irrigated lands) were lost.[262] A similar assessment for Kambarata needs to be made by independent experts.

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[261] Eusasian Development Bank. **Water and Energy Resources in Central Asia: Utilization and Development Issues.** Industry Report, 2008, p. 40, WWW: http://www.eabr.org/media/img/eng/research-and-publications/AnalyticalReports/Report_2_water_and_energy_EDB.pdf

[262] LINN, Johannes F. **Water-Energy Links in Central Asia: A Long-Term Opportunity and Challenge.** Brookings, June 30, 2008. WWW: http://www.brookings.edu/opinions/2008/0630_central_asia_linn.aspx?p=1 [06.12.2008]

Where does the execution of the plans stand today? In January 2008 Kyrgyzstan renewed the works at Kambarata 2, using own resources. Allegedly, till present day about 30% of the works are finalized. The launching of the operation of the Kambarata 2 hydropower plant is planned for January 2009.[263] There are plans to involve Kazakhstan and Uzbekistan as co-financers of the project. As for the Kambarata 1, in October 2008, the Russian President Dmitrij Medvedev, at his official visit to Bishkek signed an intergovernmental agreement with his Kyrgyz counterpart, that the Russian companies may participate in construction of Kambarata, further at the cascade of Sary-Dzhaz river and upstream of Naryn cascade. In February 2009, Kurbanbek Bakiyev at his official visit to Moscow, signed a law on ratifying the agreement between the government of Kyrgyzstan and Russia on construction of Kambarata 1. The estimated Russian investments in this project are US$ 1.7 billion.[264] Agreements are signed, but beneath the surface, both upstream countries[265] fear, that Moscow will be temporizing and siding with Uzbekistan, that is fiercely opposing the development of further regional hydropower potential.[266]

The Kyrgyz do not understand the Uzbek objections. They ask, what is wrong with Kambarata 1 and 2, if it will produce extra winter energy and allow less winter-dumping from Toktogul in non-vegetation period and saves thereby water for spring irrigation. Also, the unnecessary dumping of water into Arnasay will stop, which is positive for Kazakhstan, that will not suffer such floods as before and this will save the money intended for the construction of the Koksaray reservoir. One drawback, that needs to be taken account of is, that to get the Kambarata storage mechanism running, it will take about 2-3 years to collect the required amount of water. The main Kyrgyz message is however, that the Kambarata project brings benefits for all riparian states

[263] SHUSTOV, Aleksander. **Energeticheskij potencial Kirgizii**. In: **Vodnye problemy Centralnoj Azii**. Report.kg, 2009, p. 58, WWW: http://www.report.kg/2009/02/24/vodnye-problemy-centralnojj-azii..html

[264] RIA Novosti. **Prezident Kirgizii blagodaren Rossii za kredit i finansovuyu pomoshch**. February 3, 2009. WWW: http://www.rian.ru/trend/visit_president_Kirghizia_Russia_Bakiev_03022009/

[265] The apparent alliance of Tajikistan and Kyrgyzstan as the upstream countries in Central Asia is temporary and purpose built, because in fact, the two countries compete for the same investors.

[266] NAJIBULLAH, Farangis. **Central Asia's Great Water Game**. RFERL, February 4, 2009. WWW: http://www.rferl.org/content/Central_Asias_Great_Water_Game/1379034.html

and the harms for the environment during the period of reservoir filling are minimal.[267] Let's wait and see the findings of an independent expert group.

2. 4. 3 Koksaray

The downstream countries, Kazakhstan and Uzbekistan, are taking unilateral measures to solve the existing water allocation problems. Water storage facilities are being planned and constructed in the lower reaches of Syr Darya, to diminish the dependency on the upstream Kyrgyzstan. It is questionable, whether we should view upon projects such as Koksaray as a manifestation of unsuccessful search of a regional mutually acceptable solution.

Koksaray is being constructed as a contra-regulator to the Chardara reservoir, in South Kazakhstan, near Shymkent, with the main intention to protect Kazakhstan from the annually repeating floods. Every year Syr Darya runs out of it's shores and the inhabitants of Kyzylorda and South Kazakhstan suffer great losses, which causes social discontent. According to the UN data 250 thousand people are under direct threat of being effected by floods. The construction of Koksaray should lower this burden and collect the access water, to be used later in the vegetation period for irrigation 2-3 cu. km, to turn the risk into opportunity.

For the first time, Koksaray was mentioned in year 1998, three years later the project of contra-regulator was prepared and in June 25, 2008 the construction works were launched. The parameters of Koksaray are as follows, the full capacity is 3BMC, the location 160 km under Chardara reservoir and projected dam length is 44.7 km. Construction will run in 2 phases, first the building canal should be ready by January 1, 2009 and then the hydro-knot should be finalized by 2012. This year, the Koksaray will provide employment opportunities for 1860 people and for the Kazakh budget it will mean spending 2.5 billion of tenge (US$ 21 million).[268] The overall estimated cost is

[267] VALENTINI, K. **Vodnye polittechnologi v Tsentral'noy Azii.** In: **Vodnye problemy Tsentral'noj Azii.** Report.kg, 2009, p. 58, WWW: http://www.report.kg/2009/02/24/vodnye-problemy-centralnoji-azii..html

[268] KOPZHASAROVA, Laura. **Kazakhstan: Koksarajskoe vodochranilishche smozhet prinyat' pavodkovuju vodu uzhe sleduyushchej vesnoj**. Ferghana.Ru, November 13, 2008, WWW: http://www.ferghana.ru/article.php?id=5957

unclear, somewhere between US$ 200-500 million. Reactions to Koksaray vary greatly. President of Kazakhstan, Nursultan Nazarbaev, said that although building Koksaray is "an uneasy solution, to invest such big resources, we had no choice. Therefore we build Koksaray as a social project, similarly as in the past, when the gas pipeline from South to West Kazakhstan was built. The project will bring no profit, but might solve problems". [269]

Some see the Koksaray project as the "Kazakh variant of the Uzbek Arnasay" and therefore warn because of the experience with the negative consequences of such reservoirs. Those could be deteriorated ecological situation, because water will be mineralized, unsuitable for drinking or irrigation and the decomposing biomass will cause hydrogen sulphide to evaporate. Further, any new big water surface will decrease the gross water resources due to the evaporation and filtration (estimated 300 million cu.m/annually)[270]. Also the local microclimate will be altered; the groundwater effected and rising water level at the Koksaray can create the threat of dam overflow and losses of agricultural lands. Also a concern has been voiced, that construction of Koksaray may threaten the existence of the Northern Aral.

On the other hand, for the provinces of Kyzylorda and South Kazakhstan, the construction of Koksaray will be a gain, because the municipal budget resources that were previously used to deal with the consequences of the annual floods will be saved. For example, this year, when there was a real threat of the Chardara overflow, 20 villages and 50 inhabited areas of Kyzylorda were flooded. In the words of Kamitzhan Pulatov, the Director of Committee for Water Resources of the Ministry of agriculture of Kazakhstan, the pro and cons of Koksaray are 99:1.

Besides the Kazakh Koksaray, Uzbekistan also has some unilateral measures plans to gain additional water storage capacity. These facilities are Karamansay (0.69

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[269] KAZORINA, Irina. **Koksarajskij proekt: za i protiv**. Ferghana.Ru, July 7, 2008. WWW: http://www.ferghana.ru/article.php?id=5769

[270] ARBENIN, Sergej. **Tsentral'naya Aziya: V ozhidanii vodnovo mira**. Ferghana.Ru, March 26, 2008. WWW: http://www.ferghana.ru/article.php?id=5771

BMC), Razaksay (0.65- 0.75 BMC) and Kangkulsay (0.3 BMC) reservoirs.[271] Together with the Arnasay depression (0.8 BMC), the reservoirs provide a storage capacity of 2.5 BMC. Effect of these new Uzbek reservoirs on the Syr Darya basin states economies has been explored by the Centre for Decision Research and Experimental Economies at the University of Notingham.[272] An experiment was conducted, in the form of a 3 player trust game, considering the estimated pay off schemes for each participant from building of the downstream reservoirs. The conclusion is, although the conflict potential is reduced, the goal of achieving Uzbek self-sufficiency is not reached and basin wide efficiency is not attained. Although this experiment is just a model and it does not take into account for example the construction of Kambarata I and II, the findings are particularly interesting also for other situations, where riparian states pursue unilateral steps, with the intention to achieve water independence from their neighbours.

2. 5 Amu Darya River Basin

Firstly, we will explore the geo-morphology of the Amu Darya river basin.[273] [274] The Amu Darya is by watershed and flow the largest river in Central Asia, having an

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[271] KUDRYASHOV, Andrej. **Budushchee vodoemov Uzbekistana: usychanie Arala prinostanovilis, Ajdarkul perepolnen, v Ferganskoj doli ne planiruetsja sozdanie novych vodochranilishch**. Ferghana.Ru, August 16, 2004, WWW: http://www.ferghana.ru/article.php?id=3091

[272] ABBINK, K.; MOLLER, L. Ch.; O'HARA, S. **The Syr Darya River Conflict: An Experimental Case Study**. Centre for Decision Research and Experimental Economies, Discussion Paper No. 2005-14, The University of Nottingham: Nottingham, 2005, p. 31, WWW: http://www.nottingham.ac.uk/economics/cedex/papers/2005-14.pdf

[273] Oxus (Lat.); Araks (Antique); Djeikhun (Arab) transl. as "Wild"; Amudario (Uzbek). "Amu" (from the city Amul (Amue, Amu, former Charjou) located on the river; and "Darya" from the Persian, "great full-water river". According to a Moslem myth from the late Middle Ages, four of the world´s largest rivers have their origin in Edem, flowing from under a crystal dome into the world: the Nile, the Tigris, the Euphrates and the Djeikhun (Amudarya)

[274] Geomorphologic data such as the catchment area, volume of water resources of a river and river length vary significantly in different publications. Brackets state the second most common values. Some hydrologists a priori refrain from giving such figures, arguing such measurements are inaccurate. We use the unpublished materials available at **CAWATER info Portal** http://www.cawater-info.net/amudarya/geo_e.htm; official information from the **Amu Darya BVO** http://www.icwc-aral.uz/bwoamu.htm and the **First Assessment of Transboundary Rivers, Lakes and Groundwaters by the UNECE**, named **Our Waters: Joining Hands Across Borders** (2007) http://www.unece.org/env/water/publications/assessment/assessmentweb_full.pdf that is based on information provided by the **State Agency for Environment Protection and Forestry of Kyrgyzstan, the Ministry of Agriculture and Nature Protection of Tajikistan, the Minisitry of Natural Protection of Turkmenistan and the State Committee for Nature Protection of Uzbekistan**.

estimated catchment area of 309 thousand sq. km (another source gives the value of 465 thousand sq. km of which only the mountainous area of 227.8 thousand sq. km generates runoff). Quantifying the volume of water resources available, the total mean annual flow of all rivers in the Amu Darya river basin (without Zeravshan) is approximately 74.22 cu. km (70 cu. km).[275] The Amu Darya is sharply broken into a mountainous area, where runoff forms, and a flat area, there the runoff spreads.

Amu Darya flows over the territories of Tajikistan, Turkmenistan, and Uzbekistan, though its watershed basin also includes Kyrgyzstan. It originates in Afghanistan at the Vrevsky glacier (altitude: 4900 m) and begins flowing as "Vakhandarya". After confluence with the Pamir River, it becomes the "Pyandj". Below the confluence of the Pyandj with the Vakhsh, it is called "Amu Darya". The length of the river form the origin of Pyanj and Vakhsh Rivers is 1450 km; the total length of the river from the origin of Pyandj is 2574 km.

Summing up, the Amu Darya is formed at the confluence of the two main basin trans-boundary rivers, namely *Pyandj* (33.4 cu. km flow) and *Vakhsh* (20 cu. km flow). The main tributaries to Amu Darya are: at the left bank in the middle reaches it is Kunduz (Surkhab) and at the right bank Kafirnigan, Surkhandarya and Sherabad rivers. The surface flow is influenced by the groundwater in the Amu Darya basin, which is estimated to be 14.7 cu. km (with current extraction rate 4.8 cu. km).

Main flow of Amu Darya is fed by glaciers in Tajikistan (72.8%) and then the river runs further along the border with Afghanistan and between Afghanistan and Uzbekistan, flows across the territory of Turkmenistan, ultimately to the autonomous republic of Karakalpakstan (Uzbekistan) to discharge into delta zone near the Aral Sea.[276] Other countries also contribute to the flow formation of Amu Darya - Afghanistan and Iran (14.6%) and Uzbekistan (8.5%).

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[275] Ranging from 55-102 cu. km depending on how water abundant the particular year is. The volume 74.22 cu. km is often used in tables as a base to calculate the ratios of the contributions of each of the riparian states to the overall flow volume, as well as the particular basin rivers and Amu Darya tributaries.

[276] The river does not reach as far as the Aral Sea, allegedly already since 60s the surface flow stopped reaching Aral in the dry years. Delta zone of Amu Darya is somewhere downstream from the city Nukus in the lake area of Kungrad, Sudocye, Mezhdurechye, Karadjar.

When we observe *the different data* sets of runoff creation by riparian countries we propose that this data is subjected to *politicization*. The rationale behind such subjectivity is the desired ratio of runoff creation that should reflect in the well-founded claims for water demand and result in desirable allocations for particular riparian. The biggest discrepancies are present between Tajik and Uzbek official data. Therefore we for example see that the information on the percentage of the runoff created in Afghanistan is often intentionally heavily understated and the estimations vary greatly from 14 – 24% of the total flow, while in some cases the data on run off creation in Afghanistan is presented in one column together with Iran (which is in the case of Amu Darya negligible) and thereby diminishes the Afghan contributions. On the other hand, the data of Uzbek flow contribution is overstated and surface freshwaters are added up with the drainage waters from the fields to seemingly increase the Uzbek contributions to the total river flow.

In the Amu Darya basin there were 88 hydraulic structures, of which 36 are water intakes, 341 km of which are canals of interstate significance, and more than 100 of which are hydrological stations, among others.[277] The *Karakum Canal*, at present referred to often as Karakum River or Turkmendarya, is intensively used for irrigation water supply. It is a rather controversial installation as we will explain later, influencing till present day the bilateral relations between Uzbekistan and Turkmenistan.

Amudarya forms a complex irrigation system of canals, pumping stations, collectors and drainage facilities. Via the *Amu-Bukhara and Karshi canals*, Amu Darya is linked with the piedmont drainless areas of the Zarafshan (378 km long) and Kashkadarya (877 km long). These projects are quite unique, Karshi Steppe (pumping stations of total capacity 350m^3/sec lift water for 180m), Amu-Bukhara canal (lifts 200m^3/sec for 130m). An interesting problem arises, because these headwater structures of Uzbekistan are actually today located on Turkmen territory. The opposite is the case at the Dashauz canal that begins in Uzbekistan and passes water to Turkmenistan. A

[277] ZONN, Igor. S; GLANTZ, Michael H; KOSTIANOY, Andrey G.; KOSAREV, Aleksey N. **The Aral Sea Encyclopedia**. Springer-Verlag: Berlin, 2009, 298 p. WWW: http://www.springerlink.com/content/w6w743/?p=a9e43dfbb6ac487eba633282cd522e16&pi=5

special bilateral treaty was signed between the countries to solve handle those and other complexities.[278]

A comment needs to be made on account of the aging irrigation systems that need immense reconstructions, mainly in Karakalpakstan and Khorezm. For a better illustration of the rather complex Amu Darya river structure, we suggest to use the clear scheme in the Annex 3. Here it would also be suitable to clarify the relation of *Zeravshan river basin* with Amu Darya, as hydrologists cannot unite on this question. Pristinely Zeravshan was a tributary to Amu Darya, but lost this function with development of irrigation. Some hydrologists consider it an independent river, while others attribute it to Amu Darya basin. Zeravshan originates in the Pamir mountains and then disappears into the Kyzyl Kum desert. Tajikistan is the upstream riparian, while Uzbekistan downstream uses as much as 96% of the flow for irrigational farming. Tajikistan has plans to construct reservoir here and develop the hydro potential, which would however have an adverse effect on Uzbekistan. There is a need to reach an agreement on joint use of Zeravshan between the two riparian states.[279]

Starting from the two main Amu Darya confluences we can state, that the knowledge of the hydrological regime of the Pyandj is rather limited with the exception being the Lake Sarez that is situated at the Bartang-Murghab-Oqsu tributary of Pyandj and has its source in Afghanistan. The *Lake Sarez* was formed by an earthquake in upper part of Bartang river and is feared as a potential threat to 5 Million of people living near middle and lower Amu Darya. There are projects to turn this potential threat into cooperation, as will be suggested later. Another challenge will be the development of *Afghanistan* and possible intensification of the water allocations, as according to the 1946 agreement between USSR and Afghanistan is entitled to use 9 cu. km/ annually,

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[278] **Soglashennie mezhdu Pravitel'stvom Respubliki Uzbekistan i Pravitel'stvom Turkmenistány o Sotrudnichestve po Vodohozyajstvennym Voprosam.** Chardzhev, 1996. In: IFAS/ICWC SIC: **Mezhpravitel'stvennye Soglashenniya po Transgranichnym Vodam, Zaklyuchennye Gosudarstvami Evropy, Kavkaza i Tsentral´noj Azii. (VEKTSA).** Yuridicheskij sbornik. № 19, 2008, ICWC SIC: Tashkent, 2008, 104 p., WWW: http://www.cawater-info.net/library/rus/legal_19.pdf

[279] UNECE. **Our Waters: Joining Hands Across Borders. First Assessment of Transboundary Rivers, Lakes and Groundwaters.** Economic Commission for Europe, Convention on the Protection and Use of Transboundary Watercourses and International Lakes, UN: Geneva, 2007 , 388 p. WWW: http://www.unece.org/env/water/publications/assessment/assessmentweb_full.pdf

while currently using only 2 cu. km. Such radical change would have a significant impact on the downstream flow regime.

2. 5. 1 The Vakhsh River – Nurek, Sangtuda, Rogun

The upstream state on the Vakhsh River is Kyrgyzstan, this part of the river section is called Kyzyl Suu, while the downstream riparian is Tajikistan. This is however not the most relevant asymmetry, that the river creates, when it comes to analysing conflict and cooperation in the basin. Much more interesting is the constellation of upstream Tajikistan located on Vakhsh River that has an ambition to revitalize its' hydropower potential and the implications it has on the relationship with Uzbekistan, further down on Amu Darya.

The flow regime of the Vakhsh River is regulated mainly due to the Nurek reservoir. Nurek is located circa 75 km east from Dushanbe and it is a 300 m high earth filled dam with the capacity of 10.5 cu. km and effective capacity of 4.5 cu. km. Nurek was proposed with the intention to expand the irrigated agriculture in Central Asia in lines with the "virgin land" policy and the construction started in 1961. The current mode of operation is dual: energy and irrigation, tending lately more towards the energy regime. According to the report of the World Bank, Nurek would operate without the silt removal for another 30 years however the capacity of the reservoir to catch floods is decreasing.[280]

The Vakhsh Cascade, or the so called Vakhsh River Hydro electric system consists of a set of hydropower plants (HPP), some operating and some under construction. The already mentioned Nurek controls about 40% of the Amu Darya flow and produces annually about 3000 MW. In the 80s there were plans to increase the hydropower production, so new hydropower stations on the Vakhsh River started to be constructed. These were Rogun, Sangtuda 1 and 2, Shurob and Kafamigan (on Kafamigan River). After the break of the Soviet Union and after the civil war in

[280] WEGERICH, Kai; OLSSON, Oliver; FROEBRICH, Jochen. **Reliving the past in a changed environment: Hydropower ambitions, opportunities and constraints in Tajikistan**. Energy Policy 35 (2007) 3815-3825 p. www.elsevier.com [17.12.2008]

Tajikistan, the policy makers started reminding of these old projects. The overall idea was to achieve the capacity of 6400 MW of hydropower energy by 2030. [281]

The Rogun project includes a huge dam, large hydropower station and an enormous reservoir. Construction of Rogun started in 1976 and the initial plan was to build 6 strong turbines, each of 600 MW and dam of 335 m, which would make it the highest dam in the world. The intention was to guarantee water supply in deficient years to population and agriculture downstream, to secure the Karakum Canal with water and to produce energy. What has been constructed was unfortunately swept away with a flood in 1993. Today the plans are more humble than originally, instead of 6 turbines, 2 are to be constructed, with the capacity of 1200 MW together, so that annually 4.5 – 5 Billion kWh would be produced. Increasing the capacity in the future is also possible.

In 2004 Russian Aluminium (RUSAL) and Government of Tajikistan reached an agreement for construction of Stage 1 of Rogun HEP and Lahmeyer International[282] was commissioned to produce a feasibility study that concludes that neither stage 1, nor stage 2 would put Tajikistan in full control of the Vakhsh basin. In the meantime, RUSAL has withdrawn as a financier of the project, because of disagreements on questions such as the optimal height of the dam. The Government of Tajikistan is now to find international financing institutions that would provide the funding.[283] Vakhsh is considered to be a trans-boundary river therefore in lines with all the international and regional agreements, if Tajikistan wants to change the hydrology it has to inform and consult the downstream states. This is the basic prerequisite for safeguarding financing and implementation of the Rogun project. Further it is essential to justify the project economically. RUSAL was driven by the incentive to expand aluminium production

[281] TROUCHINE, Alexei; GIESE, Ernst. **Aktuelle Probleme der Energiewirtschaft und Energiepolitik in Zentralasien**. Nr. 28, Zentrum für Internationale Entwicklungs- und Umweltforschung der Justus-Liebig-Universität Giessen: Giessen, 2006, 50 p., WWW: http://www.uni-giessen.de/cms/faculties/research-centers/zeu-en/forschung/publications/discussion-papers/28-aktuelle-probleme-der-energiewirtschaft-und-energiepolitik-in-zentralasien

[282] SCHMIDT, R.; ZAMBARA-SCHULTZ, S.; SEIBITZ, M. **Bankable Feasibility Study for Rogun HEP Stage 1 construction completion in Tajikistan.** IN: BERGA, L. **Dams and Reservoirs, Societies and Environment in the 21st Centrury**. Barcelona: Taylor & Francis, 2006, 1394 p.

[283] Allegedly, unable to find foreign financing for Rogun, the Govermnent of Tajikistan decided to start the construction by own means. For the fiscal years 2008-2011 there is a plan to allocate annually US$150, which in a period of four years would enable the completion of Rogun to produce electricity under temporary conditions.

capacities and financiers such as the World Bank "would opt for satisfying suppressed local demand for energy exports" [284].

As for the financing, possibly an international consortium could be established (with e.g. Russian and Kazakh capital). Some estimates say that as much as 3 Billion USD need to be mobilised for the construction. When Rogun will be built, it could cover as much as 80% of Tajik electricity consumption and there will also be an opportunity to export the excess production to Afghanistan and Pakistan. As for the viability, stage 1 of Rogun seems very promising, just like Sangtuda 1.

Sangtuda 1 and 2 are planned as contra-regulators to balance out the flow irregularities. The construction of Sangtuda 1 (capacity 670 MW) started in 1986 and was revitalized in 2005 through a joint-stock company of Russian RAO Russia and the Tajik Government. Already this year, Sangtuda should start producing electricity for the winter period. By 2011 the last part of Vakhsh Cascade should be finalized – Sangtuda 2 (capacity 220 MW), financed by Iran.[285] The global trend of investing in smaller energy plants also resonates in Tajikistan in the mountain areas (Spondzh at Bartang, Savnob at Savnob).[286] As for the bigger projects, the Pyandzh Programm intends to build a similar cascade as on Vakhsh.

A pressing issue that needs to be tackled is the electrical grid that currently has a centre in Tashkent. This makes it problematic to sell Tajik hydropower energy abroad. When the N-S transmission line, that leads through Tajikistan, to Kyrgyzstan and through Kyrgyzstan to Kazakhstan, will be explored, this would enable direct electricity transports to Russia, Kazakhstan and Northern China. Other potential buyers of Tajik energy are Afghanistan, Pakistan, Iran and India. However, the foremost priority is to assure Tajik energy security, only then export of surplus energy becomes relevant.

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[284] SCHMIDT, Roland. **Onwards and upwards**. In: International Water Power and Dam Construction. Progressive Media Markets Ltd., June 2008, WWW: http://www.waterpowermagazine.com/storyprint.asp?sc=2049809

[285] SHUSTOV, Aleksander. **Energeticheskij potencial Tadzhikistana.** In: **Vodnye problemy Tsentral'noj Azii**. Report.kg, 2009, p. 58, WWW: http://www.report.kg/2009/02/24/vodnye-problemy-centralnojj-azii..html

[286] The Tajik President Emomali Rahmon also frequently mentions the Pamir HEP in his speeches.

2. 5. 2 Karakum canal

When the constructions of the Karakum canal started in year 1965 in the desert, south from city Kerki, the plan was to transfer water from Amu Darya to Ashkhabad, the capital of Turkmen SSR, which did not have a normal water supply at that time and in the future continue the installation westwards, to the Caspian regions. The grandiose project was completed in five years and it was considered a "worldwide sensation that the successors of illiterate mirabs were seen as trendsetters for the whole planet", to use the wording that resonated in the Soviet brochures of these times.[287] The Karakum canal resolves the problem of transferring the waters from Amu Darya to the dry regions of Murgab and Tedzhen oases, the Kopet-Dag area, and the western and southwestern region, for irrigation of arid lands, watering pastures land, supplying water to the towns and industrial centres.[288]

The Karakum canal is the life vein of Turkmenistan. It helped one of the poorest USSR republics to develop an area of 700 000 ha of irrigated land and to increase the cotton production by 1.1 million tons from 1960 to 1990. Not only that, but also the sanitation system of Ashghabat was improved and the fast transport connection via load-carrying boats developed.[289] The Karakum canal is today 1300 km long and there are plans to expand the project further by another 100 km. The Canal is supposedly diverting annually as much as 18 cu km of waters from Amu Darya to South Turkmenistan. One of the main drawbacks is that the Canal does not have a concrete lining therefore enormous water wasting due to infiltration into sand takes place (10 cu. km yearly). The water usage coefficient is minimal cca. 0.55-0.6. City Ashgabat

[287] VALENTINI K. L; ORLOBAEV, F. E; ABYLGAZIEVA A. K. **Water Problems in Central Asia**. International Strategic Research Institute under the President of the Kyrgyz Republic: Bishkek, 2004, 124 p. WWW: http://library.fes.de/pdf-files/bueros/zentralasien/50116.pdf

[288] EFREMOV, K. F; LAVRONENKO, O. S.; SARKISOV, M. M. **The V. I. Lenin Karakum canal in the Turkmen SSR**. In: Power Technology and Engineering (formerly Hydrotechnical Construction), Springer: New York, Vol 4, № 4/ Apr, 1970, 346-350 p. WWW: http://www.springerlink.com/content/c224g447m8242w12/

[289] GIESE, E.; SEHRING, J.; TROUCHINE, A.: **Zwischenstaatliche Wasserntzungskonflikte in Zentralasien**. Zentrum für internationale Entwicklungs- und Umweltforschung (ZEU); Institut für Geographie: Giessen, 2004, 53 p. WWW: http://www.uni-giessen.de/zeu/Papers/DiscPap%2318.pdf

resembles a swamp and about 150 pumping devices operate to save the capital from floods.

There is a long-term prevailing discourse between Uzbek and Turkmen water management experts, whether Karakum canal is the main reason behind the drying out of the Aral Sea. Uzbeks argue that since 1971, 350 cu. m/s were diverted from Amu Darya at Kerki to Karakum, which adds up to 11 cu. km annually – 19% of total Amu Darya flow. Therefore from 1956 to 1990, the Aral Sea lost about 320 cu. km of waters only due to the Karakum canal. As a result, the decrease of Aral Sea volume from 1056 cu. km to 255 cu. km can be by 40% reasoned namely by Karakum canal. Turkmen oppose, that Aral was already before 1960 in a quasi-stationing stationing state, and to maintain the water level at 53 m, 52 cu km of water needed to be ensured annually from Amu Darya. The Karakum withdrawal was only 14.6% of this rate from 1956-86 and therefore it is simplistic claim that Karakum is the main reason of the Aral catastrophe.[290]

2. 5. 3 Tuyamuyun reservoir

Built in the seventies in the lower reaches of Amu Darya, the Tuyamuyun reservoir provides water for seasonal regulation in the spring low-water periods for more than 500 thousand ha of irrigated lands in Karakalpakstan, the Khorezm Region of Uzbekistan, and some regions of the Dashoguz velayet of Turkmenistan. Also, the construction of the Tuyamuyun reservoir significantly reduced the sediment inputs during water intake into left- and right-bank main canals to create conditions suitable to construct a hydropower plant. The in-stream reservoir is the largest by area (650 sq. km) and one of the largest by volume in Central Asia with a storage capacity of 7.8 cu. km (full) and 5.3 cu. km (effective).

The Tuyamuyun reservoir is via canals and water intake structures connected with the off-channel reservoirs Sultansandar, Kaparas (for drinking water supply), and Koshbulak located in depressions on the Amu Darya left bank that made it possible to regulate the seasonal flow and ensuring a better water supply for irrigated lands. Therefore we actually can speak of a system of 4 reservoirs, one for drinking water, two

[290] GIESE et. al (2004) 13-16 p.

for water collection and one for flow regulation. Simply said, Tuyamuyun operating in seasonal regime catches the water released from Nurek and the addition flows of the Amu Darya and releases them in Feb/Mar. The great capacity of the reservoir is enough to compensate the changes in the flow regime. Downstream of the reservoir, Amu Darya is fully regulated.

The trans-boundary location of Tuyamuyun reservoir, on the border between Uzbekistan and Turkmenistan, makes it an interesting case study. The reservoir is mentioned in the Uzbek-Turkmen Agreement, which clearly states, that the service of having the water management objects of Uzbek ownership (Amu- Bukhara, Karshi and Tuyamuyun), located on Turkmen lands are to be paid for.[291] The Parties also agreed to take shared efforts in maintenance and reconstruction of the collectors; to take measures to avoid floods; and since 1999 it has been agreed, that the dumping of drainage waters into Amu Darya will stop.

Further, the agreement sets the allocation scheme of water from Kerki, which is to be divided between Uzbekistan and Turkmenistan in the equal ratio of 50:50. Not only there is the problem of sustaining the withdrawal quotas and the mutual accusation and atmosphere of non trust, but also more principal problems are present. The dens-populated Uzbekistan tends to articulate more and more that the agreed division water resources are unfair, as Uzbekistan has three times as many people to feed in the Amu Darya basin (14 million), comparing to Turkmenistan (4 million). The rhetoric of planned increase in the area of agricultural production of both countries, also does not add to the existing disputes. As the Turkmen canal runs through Karakalpakstan, incidents that farmers do not get their share of water are frequent due to resource thefts and sabotages at stations, but also evaporation and infiltration. This further strains the relations between the two downstream countries.

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[291] **Soglashennie mezhdu Pravitel'stvom Respubliki Uzbekistan i Pravitel'stvom Turkmenistány o Sotrudnichestve po Vodohozyajstvennym Voprosam.** Chardzhev, 1996. In: IFAS/ICWC SIC: **Mezhpravitel'stvennye Soglashenniya po Transgranichnym Vodam, Zaklyuchennye Gosudarstvami Evropy, Kavkaza i Tsentral´noj Azii. (VEKTSA).** Yuridicheskij sbornik. № 19, 2008, ICWC SIC: Tashkent, 2008, 104 p., WWW: http://www.cawater-info.net/library/rus/legal_19.pdf

2. 5. 4 Golden Century Lake[292]

In 2000[293], the President of Turkmenistan approved the grandiose project on creation of a man-made lake that would accumulate the collector-drainage waters (CDW) of Turkmenistan and partially Uzbekistan. This project got the name "Altyn Asyryn köli" or The Golden Century Lake. The Lake is being formed in the middle of the Karakum Desert, in the natural Karashor depression, that is 35 m under the sea level and bears a potential storage capacity of 140 cu. km. The Karashor depression area ranges from 3500 – 4000 cu. km and its maximum depth is 70-100 m.

Two feeding canals with total length of 720 km will carry the CDW to the Lake. The northern one is called the Dashoguz input canal and it diverts the drainage waters from irrigated lands of the Dashoguz velayet and a part of CDW of Uzbekistan, that are at present discharged into Sarykamysh Lake (150 cu. m/s) over Ozerny (60 cu. m/s) and Daryalyksky headers. The maximum flow of the Dashoguz input canal is 210 cu. m/s. The southern track diverts all the drainage waters from the irrigated lands in the Akhalsky, Maryisky, and Lebapsky velayets in Turkmenistan via the Main Header, uniting the drainage systems of the mentioned velayets. This system will receive waters from banks of the Amu Darya middle reaches. Annually, over 10 cu. km of collected-drainage waters will flow into the Golden Century Lake and the eventually anticipated area of the lake is 3640 sq. km. The collection systems will ensure diversion of salt flow amounting to 23 – 28 mln tons/ year from the irrigated lands in all the velayets of the country.

Turkmenistan presents the Golden Century Lake as an ecological project that will solve the pollution problem in the lower reaches of the river Amu Darya. As a result of the extracted salts, the irrigation areas will rise. The claim is, that no extra

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[292] For thorough analysis see: **Obzory i analiticheskie stat'ti: Turkmenskoe Ozero Zolotogo Veka**. VOL'MURADOV, K. M. **Turkmenskoe Ozero Zolotogo Veka I Ego Rol' v Ekonomicheskom Obdorovlenii Okruzhayushchej Sredy**. SAPAROV, U. B.; GOLUBCHENKO, V. G. **Turkmenskoe Ozero v Pustyne Karakumy.** OBRAMENKO, V. V **Turkmenistane razbudili Minvodchoz**. BALAKAEV, B. K; OVEZMURADOV. **Turkmenskoe Ozero Zolotovo Veka – Grandioznoe Gidromeliorativnoe Sooruzhenie**. DUKHOVNY, V. A. K **Voprosu o Turkmenskom Ozere**. WWW: http://www.cawater-info.net/review/turkmen_golden_lake.htm

[293] The project of dumping the CDWs into the Karakum Desert was firstly elaborated by the scientist of the Turkmen Gidrovodkhoz in the 70s. In Turkmen sources we also find the version, that when Saparmurat Niyazov was flying over Turkmenistan to a conference, he personally came up with the solution for Central Asian waters and it is namely the project of the Golden Century Lake.

water withdrawals from Amu Darya will be necessary, because the Lake will be fed solely from the CDWs. Uzbekistan on the other hand is rather sceptical this will be the case. Collecting the CDWs in the desert will cause the formation of another Dead Sea mineralised with pesticides. Large area of water will result in excess evaporation and the overall ecological impacts on Karakalpakstan are negative and fully not predictable. Since the canals lack a proper lining the spilled CWDs can form swamps and floods that might resemble the case of 1949, when the former capital of Karakalpakia had to be moved from Turtkul to Nukus.

The international community has raised a concern, that there is also an ethnical aspect[294] to the Lake. The Turkmen President allegedly issued a decret on the resettlement of one million ethnic Uzbeks living in Dashoguz to the Karakum desert, once the lake is completed. We could not verify this information, due to lack of reliable data, but the Turkmen representative from the Ministry of Agriculture denied this fact.[295]

Instead, it is worth mentioning, that in Turkmen sources the Golden Century Lake is portrayed as a catalyst for the development of the whole area, because since sand works as a natural filter, the clean waters will contribute to the formation of new cities, forests and tourist leisure resorts. It is impossible to verify when the Golden Century Lake will be completed, or how far the construction works are at the moment. The initial plan mentioned that the finalization should be dated for 2010.

2. 5. 5 Lake Sarez[296]

[294] ICG: **Central Asia: Water and conflict.** Asia Report N 34, Osh/Brussels, 2002, 39 p., WWW: http://www.reliefweb.int/library/documents/2002/icg-uzb-30may.pdf [11.12.2008]

[295] Interview with the representative from the Turkmen Ministry of Agriculture, World Water Forum, March 2009, Istanbul

[296] For a thorough analysis see a collection of scholarly articles: **Sarezkoe Ozero na Pamire. Istoriya, Problemy, Resheniya**. WWW: http://sarez.ferghana.ru/. GONCHAROV, V. S.; SKOMAROVSKIJ, A. N. **Izuchenie fil'tratsii cherez Usojskij zaval.** PAPYRIN, L. P. **Pravoberezhnyj Oplozen'**. KAZAKOV, Yu M. **Sarezkoe Ozero. Usojskoe Perekrytie i Pravoberezhnyj Sklon**. PAPYRIN, L. P. **Sarezkaya Katastrofa: Geoflzicheskij prognoz**. UMAROVICH, Pirov A. **Na Zimnem Sareze (zapiski gidrologa).** Ferghana.Ru

The Lake Sarez is the largest naturally formed, rock-dammed lake in Tajikistan deep in the Pamir Mountains, with a volume of nearly 17 billion cu. m. It was created in 1911 after an earthquake, when an enormous rock collapsed from the bank of the Murgab River Valley, forming a natural dam behind which a lake grew. The so called Usoy Dam with a height of over 550m is located at an altitude of 3200 metres, being the tallest natural or man-made dam in the world.[297] The length of the Lake is 60 km and maximum depth 500 m. Currently the water level is about 50 m below the top of the dam rising, 20 cm annually as a result of increased glacial melt, due to global warming.

Should the Usoy Dam break as a result of an earthquake or landslide (or eventually as a consequence of a terrorist attack), in the closeness of the Sarez Lake, this would cause a flood that would endanger millions of people in Tajikistan, Uzbekistan, Turkmenistan and Afghanistan. Now there is an early warning system operating on daily basis that monitors the "behaviour" of the Lake as a result of the joint effort of the Tajik government and the World Bank[298]. Also people are being trained to be able to respond to an emergency. In 2005 the alarm of the early warning system went on because of the sudden rise by more than 25 cm in the level of the lake.

Within the project of "Lake Sarez Risk Mitigation for 2000-2006" special attention was paid to the proposal of the Tajik authorities to provide 17 cu. km of the purest water from Lake Sarez for drinking. Some scientists [299] claim, that the actual volume of the ultra fresh water with low mineralization is actually only 4-5 cu. km and that if the water levels will decrease by 50 m for safety purposes, then no fresh water will remain available for further distribution to neighbouring countries.[300] Tajik ecologists also keep silence about the planned large silver deposit at Ak-Djilga that could cause the penetration of industrial waste into Lake Sarez.

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[297] Both Uskoy and Sarez were named after villages, that were flooded.

[298] **World Bank.** A Safer Lake Sarez, 2005 http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/TAJIKISTANEXTN/0,,contentMDK:20615350~menuPK:287269~pagePK:141137~piPK:141127~theSitePK:258744,00.htm

[299] PAPYRIN, Leonid. **Myths on the Lake Sarez risk mitigation and realities**. Ferghana.Ru, 2007, 23 p. WWW: http://enews.ferghana.ru/article.php?id=2079

[300] This wording was repeated in an opening given by the Tajik President Emomali Rahmon at the World Water Forum in Istanbul, March 2009

Some of the proposed solutions to the Sarez security threat are to: (1) increase the height of the dam; (2) decrease the water level of the lake by means of tunnel. Funding is always the weakest side of any proposed strategy. The Lake is situated in a non-easily accessible area, with no road leading straight to its shores and the last 18 km must be walked.[301] The estimated costs of are enormous and neighbouring countries do not realise, that should a catastrophe take place, they would be in economic terms much worst effected than Tajikistan. A spill of the Sarez Lake would wash away irrigational lands of Uzbekistan and Turkmenistan. This fact is not mirrored in actions or regional initiatives. Tajikistan is trying to attract foreign funding and a good strategy is to present Lake Sarez as a case study within the UN's World Water Assessment Program and UNESCO's From Potential Conflict to Co-operation Potential that deal with challenges of water security.[302]

2. 5. 6 Afghanistan

Afghanistan is a key riparian state in the Amu Darya basin, with 8% of the flow, 12% of the territory and 25% of the population. Although being a large water supplier, the fellow riparian states have established water management structures that have not included Afghanistan, nor recognized its' interests (ICWC, IFAS, BVOs). There have been some talks about including Afghanistan into IFAS, on the bilateral level of Tajik Embassy in Kabul and Afghani Embassy in Dushanbe, but without any visible success. This has not changed even after year 2002 with the removal of Taliban government in Afghanistan, a clear opportunity for co-riparian states to recognise the Afghani water rights and responsibilities.

For sure the reconstruction of Afghanistan will be accompanied with greater water withdrawal. One of the priorities of development is to reactivate the damaged watering system, as 40% of the irrigation system has been destroyed. Specially, as the international community in lines with fighting the narco-business supports a change in

[301] KHAMIDOVA, Parvina. **Lake Sarez in the Pamirs as viewed by Tajik journalists.** Asia Plus Tajikistan for Ferghana.Ru, 2004, 3 p., WWW: http://enews.ferghana.ru/article.php?id=415

[302] STEWART, Bruce. **Evolving hazards – and emerging opportunities**. World Water Development Report 3, Water in Changing World, Chapter 12, 211- 225 p. WWW: http://www.unesco.org/water/wwap/wwdr/wwdr3/pdf/24_WWDR3_ch_12.pdf

the Afghani crop pattern from opium to cotton production.[303] This could seriously alter the regional stability. Until now, the Afghani water demand was rather humble, only using 2 cu. km annually (1.7 cu. km surface water, 0. 3 cu. km ground water), while actually according to the Agreements between Soviet Union and Afghanistan (1921, 1946, 1956), being entitled to 9 cu. km of Pyandj annually. All-throughout the years, this quota has not been reached, but with the plans to expand the agricultural production in Northern Afghanistan, this could be the case. Further, Afghanistan plans to revive it's hydroelectric potential at the tributary rivers of Amu Darya – Kunduz and Kocha[304].

2. 6 Summing up the Factor of Water in Central Asia

With the intention to prove the claim, that the Factor of Water plays an extraordinarily prominent role in the Central Asian political affairs, we drew together five chapters.

The introductory part sets a solid departure point, sketching the culturally-historical background to the topic of inquiry. We suggested some observations, related to the Central Asian context: both the spiritual (Islam) and the economic (Cotton and Hydropower) values of water; the challenges facing the region (Demography, Climate change, Afghanistan); scarcity versus the unequal distribution of water resources; or the link between hydro-politics and geo-politics. A short country profile of each of the 5 states, with special consideration devoted to trans-boundary water issues was presented. Some of the regional cooperation frameworks (ICWC, IFAS) were plotted, including

[303] This idea is not viable due to a set of reasons: (1) cotton is a water-demanding plant and growing it in arid conditions brings negative consequences, as we have seen at the Aral Sea tragedy. (2) the revenues from cotton sales could hardly substitute the revenues from drug trade. (3) the position of Uzbekistan as the cotton produces could be threatened. (4) cotton growing brings along other negative externalities, such as child labor. (5) while the international community is trying to tackle the negative consequences of cotton production in Uzbekistan, it would be introducing a similar scheme to the riparian state. (6) it remains unclear, for who such a project would be beneficial.

[304] MAHMOUDZADEH, Manijeh; WEGERICH, Kai. Much **Ado About Nothing – Sub-basin working groups in Kunduz River basin, Afghanistan**; HORSMAN, Stuart. **Afghanistan and Transboundary Water Management on the Amu Darya: A Political History**. In: RAHAMAN, Muhammad M.; VARIS, Olli (Ed.). **Central Asian Waters: Social, Economic, Environmental and Governance Puzzle**. Water and Development Publications. Helsinki University of Technology. 2008, 158 s. Also available WWW: http://www.water.tkk.fi/English/wr/research/global/material/Central_Asian_Waters-book.pdf

the key inter-governmental and international legal acts concerning trans-boundary water cooperation.

Two particular phenomena needed more explanation and therefore separate chapters were designed to provide this space. To understand the trans-boundary water politics in Central Asia better, we felt the necessity to set it within a more general framework of trans-boundary water cooperation of the Newly Independent States. The dissolution of the Soviet Union meant such a radical turn in the development trajectories of all spheres of life, including the field of trans-boundary water management and security; that in the transitional societies we can observe some common denominators abstaining in the non-CIS countries. We felt that the most suiting spatial delimitation for our purposes is the territory of UN Economic Commission for Europe. The second significant phenomena that in a special manner shaped the Central Asian water situation, and particularly foreign involvement in the region, was in our opinion the Aral Sea Catastrophe. Both of these factors contributed substantially to the raised external interest in the Central Asian affairs.

To complement to the political country approach, we also followed hydrological basin boundaries and chose a series of case studies in both of the Aral Sea sub-basins. The various constellations of regional and bilateral conflict and cooperation interaction were looked upon in greater details on Syr Darya (Toktogul, Kambarata, Koksaray) and Amu Darya (Nurek, Sangtuda, Rogun, Karakum, Tuyamuyun). Also other examples of regional relevance were raised (Golden Century Lake, Sarez and Afghanistan).

In our research we came across some remarkable cleavages. The first one, that we would like to mention, is the cleavage between "revisionist" and "pro-status quo" states in regards to water politics, which does not always correspond with the wider regional context of political relations. This basically means, that some states are satisfied with the roles assigned to them during the Soviet era and wish to continue this pace (Uzbekistan), while others have a different idea about how their present development paths should be shaped (Kyrgyzstan, Tajikistan). Obviously, this is only a schematic simplification, but that is what models are good for, to illustrate tendencies difficult to spot within the holistic context.

The mentioned cleavage is further backed by the nexus of: upstream and the downstream; hydropower and irrigation; water and energy; geopolitics and international law; national and regional affairs; riparian and basin-wide approaches; external and internal influence…

Recent development authentically illustrates all of the mentioned links in the light of securitization. We have in mind the:

1. Compound water-energy-food crisis (and financial crisis)[305] in Tajikistan 2007/08 (and so far to a smaller extent in Kyrgyzstan this year)

2. The pragmatic Uzbek lead down-stream coalition (April 2009)

Speaking of the water crisis, researches suggest we should differentiate between the 3 separate categories: (1) access to drinking water; (2) pollution; (3) scarcity. [306] On the background of the global rising level of food and fuel prices, after the harsh winter 2007/08 and the subsequent spring draughts the compound water-energy-food *crisis arose in Central Asia. Tajikistan, the mountainous and landlocked country; still* coping with the consequences of the civil war; being dependent on it's neighbours for energy and food; with a population of 64% living under the poverty line; with a significant percentage of national income being formed abroad and sent home by migrants in the form remittances and with the economic growth (e.g. aluminium exports) not translating in the better standard of living; became most effected by the compound crisis. The country lacked the resources and capacity to respond adequately

[305] On the impact of the current global financial and economic crisis on Central Asia, see. E.g. LINN, Johannes F. **Connecting Central Asia with the World**. Prepared for the First Eurasian Emerging Market Forum, Gerzensee, January 31 – February 2, 2009, 21 p. WWW: http://www.brookings.edu/papers/2009/0202_central_asia_linn.aspx

[306] LALL, Upmanu; HEIKKILA, Tanya; BROWN, Casey; SIEGFRIED, Tobias. **Water in the 21st Century: Defining the Elements of Global Crises and Potential Solutions**. In: Water a Global Challenge, Journal of International Affairs, Vol. 61, № 62, Spring/Summer 2008. WWW: http://jia.sipa.columbia.edu/spring_08/Lall_and_Heikkila_preview.pdf [14 February 2009]

and the international community also did not have a proper integrated strategy to tackle the crisis.[307]

This is in fact, what crises are good for, it is the time of decisive action, an opportunity for change. For our case, we consider as relevant the July 2008 meeting of 15 international and bilateral agencies in Alma-Ata that gathered to plan an appropriate response to the compound crisis.[308] Further, it is the October 2008 Bishkek Heads of Central Asian countries meeting within the framework of the Commonwealth of Independent States, that took place to address the pressing regional water-energy issues. An agreement was reached, as a sign of the existing political will to cooperate, that the upstream countries would be receiving gas and electricity to cover their needs in the autumn/winter period 2008/09, which would be fully provided by the downstream countries.

However, the next winter, the Tajik Embassy in Kyrgyzstan published an interesting press release. It states that due to unilateral Uzbek actions, the Turkmen deliveries of gas are not reaching Tajikistan, which is forced to once again introduce the strict energy regime at Kayrakkum and Nurek.[309] Later that spring, Uzbekistan vice versa, declared it's official position against the construction of new hydropower generating facilities, upstream.[310] The declaration calls for an independent UN expertise, before any major construction takes place and the necessity for all the riparian states to approve of such projects.[311] Before the official position was made public, the Uzbek President, Islam Karimov, made a phone-call to his Kazakh and Turkmen

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[307] FUMAGALLI, Matteo. **The "Food-Energy-Water" Nexus in Central Asia: Regional Implications of and the International Response to the Crisis in Tajikistan**. EU-Central Asia Monitoring, No. 2, Centre for European Policy Studies, October 2008, WWW: http://www.eucentralasia.eu/files/1731.pdf

[308] LINN, Johannes F. **The Compound Water-Energy-Food Crisis Risks in Central Asia: Update on an International Response.** The Brookings Institution, August 12, 2008, WWW: http://www.brookings.edu/opinions/2008/0812_central_asia_linn.aspx

[309] Ferghana.Ru. **Tadzhikistan: Press-reliz o slozhivshejsya slozhnoj situatsii v oblasti gidroenergetiki**. February 11, 2009, WWW: http://www.ferghana.ru/news.php?id=11279&mode=snews

[310] Ferghana.Ru. **Uzbekistan: Zayavlena ofitsial'naya pozitsiya po voprosu stroitel'stva novych GES.** April 14, 2009, WWW: http://www.ferghana.ru/news.php?id=11690&print=1

[311] The President of the World Bank, Robert Zoellick, wrote a letter to Islam Karimov. The letter concerning the construction of Rogun, was published in the Uzbek governmental newspaper, Pravda Vostoka on April 23, WWW: http://www.cawater-info.net/news/04-2009/29_e.htm

counterparts in the attempt to build a "downstream coalition", as preparation for the IFAS Summit held in Alma-Ata later that month. This pragmatic downstream alliance is given as a rare example of regional diplomacy. Contrary "upstream coalition" has not yet been built, most likely, because "Tajikistan and Kyrgyzstan in fact compete for the same investors".[312]

Moscow is one of the important investors that they compete for. It remains impossible for us to explore what exactly the real factors are that influence for example which of the new hydropower projects will be preferred by Russia, over another. This is a subject to different hidden political games, where even the drug traffic corridor might play a certain role. Alexej Malashenko from the Carnegie Moscow Centre said for Radio Free Europe, that Moscow seeks to play a mediating role in Central Asia, but it does it through means that prove it's inability do so.[313] In April 2009 there were two turns concerning the relation of Moscow towards the Central Asian countries. The first one was the official visit of Russian President Dmitrij Medvedev in Tashkent, where he agreed that the construction of new hydroelectric power stations needs to be supported by the consent of the entire region. This move offended Tajikistan and cooled down the Tajik-Russian relations. The second turn was the visit of Kyrgyz President Kurmanbek Bakiev to Moscow, where the construction of Kambarata was agreed. Uzbekistan was the offended one this time, as President Islam Karimov expected to be invited to invest into Kambarata.[314]

We observe an increasing interest of the regional cooperation groupings, such as Shanghai Cooperation Organization (SCO), or the Collective Security Treaty Organization (CSTO), to deal with trans-boundary water management and security, as a sign of securitization of regional water politics. In fact, the SCO also provides a platform for exploring the link between water and border issues, separatism, terrorism,

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[312] Interview with Andrej Valentovich Grozin, Director of the Department of Central Asia and Kazakhstan, Institute of CIS countries, Moscow, November 2007

[313] NAJIBULLAH, Farangis. **Central Asia's Great Water Game**. RFERL, February 4, 2009, WWW: http://www.rferl.org/content/Central_Asias_Great_Water_Game/1379034.html

[314] SHERMATOVA, Sanobar. **Inspektsiya soyuznikov. Ch'yu storonu zajmet Moskva v spore o vode?** Ferghana.Ru, April 21, 2009, WWW: http://www.ferghana.ru/article.php?id=6141&print=1

minority issues.[315] The Prime Ministers of the SCO met in October 2008 and signed several interesting declarations and agreements. Within the EvrAsES the project of Water-Energy Consortium was presented as the way to solve the joint management of trans-boundary water courses. Unexpectedly, in autumn 2008 Uzbekistan left the organization, so all the progress made since the September 2006 Sochi Summit failed. Therefore, the SCO remains as the only platform where the basin riparian states of Central Asia could negotiate a region wide agreement.[316]

However, we believe that the involvement of the particular regional integration arrangements (RIAs) in water (and energy) issues of Central Asia deserves a far more thorough analysis than was possible within the scope of this final thesis.

[315] SHARIPZHAN, Mrhat. **In Central Asia, Water Could Lead to Fire**. RFERL, July 23, 2008, WWW: http://www.rferl.org/content/Commentary_Water_Crisis_Central_Asia/1185586.html

[316] GROZIN, Andrey. **Mirovoj krizis otodvinul reshenye vodnogo voprosa v Tsentral'noy Asii.** Institute of Commonwealth of Independent States: Moscow, February 6, 2009. WWW: http://www.materik.ru/rubric/detail.php?ID=3323

Conclusion

After the dissolution of the Soviet Union, a general euphoria arose among the Newly Independent States of Central Asia. Suddenly, as sovereign states, they had a chance to pursue their own national interests. The natural resources, such as oil, gas or water served this purpose as an instrument. Our final thesis offered an overview, of how the Factor of Water influenced the international affairs in the examined region.

Summing up, water governance plays a prominent role in interstate and regional relations of Central Asia. For each of the states however, the ranking of water amid the other national priorities is quite distinct. We illustrate this finding by listing, who headed the particular Central Asian delegations at the 5th World Water Forum in Istanbul, March 16-22, 2009:

(A) High level representation:

President of Tajikistan (Emomali Rahmon),

Prime Minister of the Republic of Kyrgyzstan (Igor Chudinov);

(B) Expert level representation:

Minister of Agriculture of the Republic of Kazakhstan (A. Kurishbaev), Vice-minister of Water Resources the Republic of Turkmenistan (K. Atalyev) and Vice-minister of Water Resources and Agriculture of the Republic of Uzbekistan (Sh. Khamraev).

This observation in fact reflects what significance is given to the global water debates in each of the Central Asian states and does not necessarily have to correspond to the domestic priority setting. Rather, we conclude, that for Tajikistan and Kyrgyzstan the optimal level of problem-solving at the international scene is political, while for Uzbekistan, Kazakhstan and Turkmenistan it is the technical level. Presumably, the fact that the two upstream countries of the Aral Sea basin were mostly damaged by the "compound water-energy-food crisis" considerably intensified the securitization of water, which partially explains the high priority setting. This tendency can be further verified, by analyzing the declarations and speeches of Heads of States of both of the water-abundant countries.

Mapping the relations among all of the Central Asian Heads of States, at a bilateral and regional scale, gives us an idea about the state of the water-relations. Hydro-politics reflects to a certain extent the overall political situation. Sometimes pragmatic one-solution coalitions emerge, like was the case of the Uzbek lead down-stream alliance initiative before the Summit of Heads of States of the IFAS in April 2009.

Water often becomes the subject of high politics, when linked with energy. Proponents of this issue-linkage stem mostly from the upstream countries, while on the other hand critique is voiced from downstream countries and the regional basin organizations. For example, Vadim Sokolov argues, that even though, the public might get the impression, that water problems concern high politics, in fact, they are mostly dealt with on a resort level, in Uzbekistan and Kazakhstan at the Ministry of Agriculture and Irrigation, while in Kyrgyzstan, within the scope of the energy sector. Also locally, some trans-boundary questions are far more effectively solved at the level of provinces, than at the high interstate level. Sokolov, further argues, that while energetics has already since the Soviet times a clear commercial character, agriculture is of social nature.[317] We wish to challenge this opinion, because we equally recognize the commercial value of cotton production, as the social value of proper energy supplies. At this point it is suitable to mention the ongoing debate about water as a tradeable good or/and human right.

After addressing how high on national agenda of the Central Asian states the Factor of Water is, let's move on to summing up the nexus between theory and practice that was presented within this final thesis. To what extent is the theoretical background applicable in the case of Aral Sea basin?

We will start by applying the *theory of hydro-hegemonies* to the Aral Sea basin. The decisive criteria in determining a hydro-hegemony are Power (economic, political and military), Position (upstream or downstream) and Potential (infrastructure and

[317] Interview with Vadim Sokolov, Deputy Director of Scientific-Information Centre of Interstate Coordination Water Commission, at the 5th World Water Forum, Istanbul, March 2009

technology). When applying these three criteria to the Aral Sea basin, there is not a single clear hydro-hegemony obvious. Several states strive to employ the resource control strategies, such as capture, integration and containment. All of the strategies are being contested, as the particular constellations at the Syr Darya and Amu Darya rivers demonstrate. Sometimes the power criteria preponderates, at other times the position. This is perhaps what hinders the proper application of the hydro-hegemonic model to real life situations. The theory is however crucial in helping us to realize, the importance of power analysis when assessing trans-boundary basins. Some scholars have applied the hydro-hegemonic theory to the Aral Sea basin. Suvi Sojamo for example, employed an additional variable – time, and illustrated the trajectories of the developing bilateral relation from the point of view of Uzbekistan as a hydro-hegemony.[318]

Regime formation theory proposed a set of four conditions that increase the likelihood of regime formation at a trans-boundary river: Power, Interest, Knowledge and Context. (1) In the presence of a downstream hegemony, Power would contribute to the formation of a regime. If we take Uzbekistan as the Aral Sea hegemony, than the claim can be confirmed, because it is namely Power that balances out the unfavourable Position. Military power, direct foreign investments from cotton production and enormous population are some elements of Uzbek power. To verify the hypothesis, we state, that (a) ICWC is located in Tashkent and employs mostly Uzbek staff; (b) Uzbekistan contributed to the regime formation by signing the two relevant international legal instruments. (2) When there is a consonance of the riparian interests, the regime formation is more probable. Evidence can be drawn from Central Asia, where in a situation of symmetric collective problems (Aral Sea catastrophe) the likelihood of cooperation is higher than in the case of asymmetric externalities (increasing hydro-potential; constructing a dam). (3) In the presence of an epistemic community the probability of regime formation is increased. Hopefully, the International Water-Energy Academy in Bishkek will soon materialise the Knowledge argument. (4) Finally, context also plays a significant role, for example the regional

[318] SOJAMO, Suvi. **Illustrating co-existing conflict and cooperation in the Aral Sea Basin with TWINS approach**. In: RAHAMAN, Muhammad M.; VARIS, Olli (Ed.). **Central Asian Waters: Social, Economic, Environmental and Governance Puzzle**. Water and Development Publications. Helsinki University of Technology. 2008, p. 75-86, WWW: http://www.water.tkk.fi/English/wr/research/global/material/Central_Asian_Waters-book.pdf

integration arrangements are increasingly involving in water agenda, because of the earlier established regional ties.

Cooperative game theory has been used in this thesis to (1) elucidate the negotiating patterns at the Toktogul reservoir; (2) show how unilateral action of Uzbekistan to construct new storage-reservoirs would influence the basin wide affairs. In the case of Toktogul, the trust game manifested the motivation of the riparian states to reach an agreement in both water abundant and water poor years. The timing, proved to be the ultimate flaw of the entire system of bargaining. If the agreements were reached in winter months and via issue-linkage also referring to energy, Kyrgyzstan would have a much higher motivation to fulfill the set conditions. This application further revealed that techniques such as using threats and giving ultimatum have often far more repercussions than debating. The second experiment expressed that Uzbek unilateral steps would neither lead to water self-sufficiency of Uzbekistan, nor to basin wide efficiency. Game theories are models that often do not anticipate future development, but under controlled conditions can clearly manifest the general tendencies.

Applying the *international law theory* to Central Asia, we can see some signs of the Harmon Doctrine of "absolute territorial sovereignty" over natural resources, but mostly states recognize at least in theory the "duty to cooperate". The principle of "no significant harm" is being referred to most widely, by Uzbekistan, which is symptomatic for downstream riparian states in general. On the other hand, "equitable utilization" is appealed to by the upstream states. Secondly, as for the ratification of international legal instruments, which in the case of Central Asia is perceived as a strategy to gain international legitimacy, so far, the UN WCC has been ratified by Kazakhstan, Tajikistan and Uzbekistan; and the UNECE Water Convention by Kazakhstan and Uzbekistan. The latter Convention actually being in force, appears to be challenging for the Central Asian states, because being developed in Europe, it deals primarily with questions of water quality, rather than allocation and quantity.

We recognized another complication. If let's say Uzbekistan ratifies an Agreement, from the perspective of Kyrgyzstan this Agreement already received a "downstream tag" and is therefore not suitable nor beneficial for upstream states.

Within the global water debates disparate downstream riparian lobby groups emerge, that support each other in international forums. On appealing to the International Court of Justice, this remains an option which has not been utilized yet, but allegedly Uzbekistan considered doing so at a number of occasions, when Kyrgyzstan was not honoring accords.

Overall, international law argumentation seems to be employed as a call for support from the international community, together with the environmental argumentation, as two examples of *Idealism* in International Relations theory, complementary to the *Realism* power driven discourse.

The theoretical chapter of this thesis has reached a conclusion, that the *Management and Security approaches are increasingly interconnected.* This can be verified also in the case also in the Aral Sea basin. While scarcity rarely contributes to conflict, it is the management issues that are often contested. In the attempt to tackle the unequal distribution of resources, the state representatives think primarily in the lines of *Supply-side management* and much less in terms of *Demand-side management.* The foremost interest is how to increase the supply of water available (e.g. Diversion of Siberian rivers; or Koksaray), but the opposite question of how to reduce the water required is rarely voiced. The concept of "*virtual water trade*" is so far merely virtual, and also the idea of "*turn of the screw*" and reallocation of production into a more profitable sector remains unrealistic (in particular in the context of cotton production).

Returning to our initial theoretical sub-division of Management and Security, we have more closely looked upon one representative initiative from each approach, both situated in the Ferghana Valley: (1) Integrated Water Resource Management and; (2) Environmental Security.[319]

We have reached these conclusions:

[319] IWRM Ferghana: Publikatsii proekta "JUVR-Fergana": http://www.cawater-info.net/library/iwrm.htm
ENVSEC Ferghana: Central Asia Publications: http://www.envsec.org/centasia/index.php#pub

(1) Although the foreign concepts are designed in a way to support the regional element and therefore include at least 3 states of the region, each of the participating countries acts quiet independently within these frameworks. Therefore, even within trans-boundary projects the inter-state affairs are hardly tackled and the synergetic effect is not attained. This is mainly due to the lack of internally driven regionally grounded identity (or river-basin grounded identity). Thinking in terms of the region is usually motivated by pragmatic reasons, such as receiving funding from the international organizations. [320]

(2) The institutional mechanisms designed to implement initiatives such as IWRM or ENVSEC lack the competences to do so comprehensively. The basin organizations, nor the Environmental Ministries have the mandate to act in political affairs. Therefore the good ideas can often not be executed.

(3) When implementing the foreign concept in the Newly Independent States (such as the integrated approaches), we need to bear in mind, that sometimes they resemble the Soviet inertia, which in the process of transformation might not always be desirable. Hereby we are not saying, that everything Soviet was categorically bad, we are merely indicating, that even with the best possible intentions, funky concepts such as "basin-wide management", "long-term planning" or "issue-linkage" could be "lost in the translation". Further, the externality of initiatives such as IWRM and ENVSEC, is that some elements of civic society are supported in Central Asia, such as "stake-holder participation", "gender issues" and "environmental considerations".

We express the hope that we managed to combine the thematic framework of trans-boundary water politics together with the Central Asian regional case studies of the Syr Darya and Amu Darya basins in an engaging manner.

Further research questions that remain unanswered comprehensively are for example, what are the interests of the geopolitically relevant external actors in The

[320] In our final thesis, we also presented the opposing point of view, that in fact the Aral Sea catastrophe and common historical and cultural roots shape the regional identity and solidarity. We believe these tendencies co-exist, and sometimes logically, sometimes spontaneously one dominates over the other.

Factor of Water in Central Asia? Do they drive or hinder the regional cooperation in water management and security? What is the role of the regional integration arrangements in the Central Asian water affairs? How is the development of the other trans-boundary basins in the NIS evolving? What are the other pressing trans-boundary environmental issues in the NIS? Or, another approach could be chose, for example taking Kazakhstan and in the light of it's OSCE 2010 Presidency, analyzing the water affairs (including the Sino-Kazakh trans-boundary water relations).

Polonius: What do you read my Lord?
Hamlet: Words, words, words.

Despite of the floriferous rhetoric of good neighbourly relations, ancient traditions and exceptional ties of the brotherly nations; or the concepts of "hydro-solidarity" and "hydro-egoism" - all that really matters in the end is political will (and fortuity).

Resumé

Když spatříme dokumentární fotografie vysychajícího Aralského jezera, které zobrazují nic než písek, trosky korábů a velbloudy, získáme dojem, že region Střední Asie strádá nedostatkem vody. Skutečným problémem je však spíše nerovnoměrné rozložení vodních zdrojů mezi jednotlivými státy regionu, což přispívá k vytváření vzájemných závislostí. Na území států Střední Asie, které se nacházejí na horním toku řek, se vytváří převážné množství vod, které jsou spotřebovány zejména státy na dolním toku řek. Můžeme proto tvrdit, že pozice států na trans-hraničních řekách významně ovlivňuje stav hydro-politických vztahů v konkrétním povodí. Kyrgyzstán a Tádžikistán, umístěny na horním toku Syrdarji a Amudarji, mají možnost regulovat množství a načasování toku příslušné řeky, prostřednictvím svých vodních nádrží. V budoucnu, oba státy plánují posilnit svůj hydro-energetický potenciál, vybudováním nových vodních elektráren (Kambarata, Sangtuda, Rogun).

Záhy po rozpadu Sovětského Svazu, začaly nové suverénní státy realizovat své národní zájmy. Protože mezi nejzákladnější priority každého státu patří zajištění vlastní bezpečnosti, uplatňovaly nezávislé středoasijské republiky tento nárok, v oblastech vodní, energetické a potravinové bezpečnosti (popřípadě také enviromentální a lidské bezpečnosti), které jsou pro účely našeho výzkumu nejvíce relevantní. Voda tímto začala být vnímána jako strategická surovina (a také zboží, jehož obchodováním možno předcházet válkám).[321]

Zároveň, Uzbekistán a Kazachstán soupeřily o dominantní regionální mocenské postavení, přičemž oba státy měly dostatek předpokladů, aby tuto pozici obhájily. Proto dalším indikátorem mezistátních vztahů v povodí je moc. V souladu s teorií, když je v dolním toku řeky přítomen hegemon, zvyšuje to pravděpodobné formování režimů trans-hraniční spolupráce. Povodí Aralského jezera tuto premisu potvrzuje, protože (1) státy na dolním toku jsou signátory obou mezinárodních smluv, které se týkají trans-hraničních vodních toků; (2) státy na dolním toku podporují regionální spolupráci

[321] Obchodování s vodou je jedním z nejčastějších argumentů proti pravděpodobnosti výskytu válek o vodu. Proč by se státy pouštěly do vojenských akcí, když si vodu můžou koupit. Dále pak například historie (nedostatek empirických důkazů z minulosti), nebo strategie (nebylo by strategicky moudré, rozpoutávat válku o vodu). Viz například: BARNETT, WOLF, STUCKI

(Uzbekistán – Komise mezistátní vodohospodářské spolupráce; Kazachstán – „velký integrátor“)

Ve všeobecnosti, státy v poříčí řeky se snaží „znárodnit“ výhody a „internacionalizovat“ břemena. Proto upřednostňují uplatňování „hydro-egoismu“ před „hydro-solidaritou“, přičemž využívaní integrovaných přístupů k vodohospodářství (IWRM) by přineslo všem zúčastněným více prospěchu. Nicméně kvůli nedostatečné politické vůli a prostředí vzájemné nedůvěry je nutné zlepšit podmínky pro vyjednávání, například prostřednictvím spojením problémů (vody a energetiky), nebo na globálních vodních fórech (ku příkladu Světové Vodní Fórum, Istanbul 2009). Přesto možno učinit závěr, že v povodí Aralského jezera, spolupůsobí současně jak kooperace, tak i konflikt.

Summary

Central Asia is not as water-scarce as might seem, when looking at the World Press type documentary photographs of the desiccated Aral Sea, portraying nothing but sand, ship wrecks and camels. Nevertheless, the water resources are unevenly distributed among riparian states and consequently, strong interdependencies emerge. The upstream states form most of the water flow, which is withdrawn further downstream. Therefore the position on the trans-boundary river is important when analyzing the hydro-political relations at the basin. Kyrgyzstan and Tajikistan, being located upstream on the Syr Darya and Amu Darya rivers, can use their storage reservoirs and dams to regulate the timing and quantity of the river flow. The states intend to enhance their hydropower potential, by constructing new facilities (Kambarata, Sangtuda, Rogun).

After the dissolution of the Soviet Union, the Newly Independent States of Central Asia started pursuing their own national interests. Since security is the foremost priority of each state, the sovereign countries wanted to assure their water, energy and food security (possibly environmental and human security), just naming the components

relevant to our inquiry. Therefore water started to be looked upon as a strategic resource (and good, that could possibly be traded to avoid war).[322]

Simultaneously, Kazakhstan and Uzbekistan started aspiring for the regional leadership, each having a set of arguments supporting this claim. This is where the next indicator of basin-wide relations comes in, power. As theory indicates, the downstream hegemony encourages the regime formation at a trans-boundary water basin. This is the case also in Aral Sea basin, where (1) downstream states are the signatories of the relevant international legal instruments concerning trans-boundary water courses; (2) downstream states encourage the region wide cooperation (Uzbekistan – basin organization; Kazakhstan the "grand integrator").

Overall, riparian states endeavour in nationalizing the benefits and internationalizing burdens. Thereby they rather involve in "hydro-egoism" instead of "hydro-solidarity", although an integrated approach to water resource management could in consonance with the "benefit sharing" concept bring everybody a wider array of gains.[323] However, because of the lacking political will and mutual mistrust a conductive negotiation environment needs to be created via issue-linkage (tying water and energy issues together) or at global water forums (such as the World Water Forum in Istanbul 2009). Nevertheless, cooperation and conflict in the Aral Sea basin co-exist.

[322] Water pricing is one of the popular arguments against the plausibility of water wars. Others history (lack of empiric evidence of water wars in the past), or strategic (it would not be strategically wise to launch a war over water). For more insight see E.g.: BARNETT, WOLF, STUCKI

[323] As Sadoff and Grey put it: to, from, beyond and because of the river.

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Map of Central Asia
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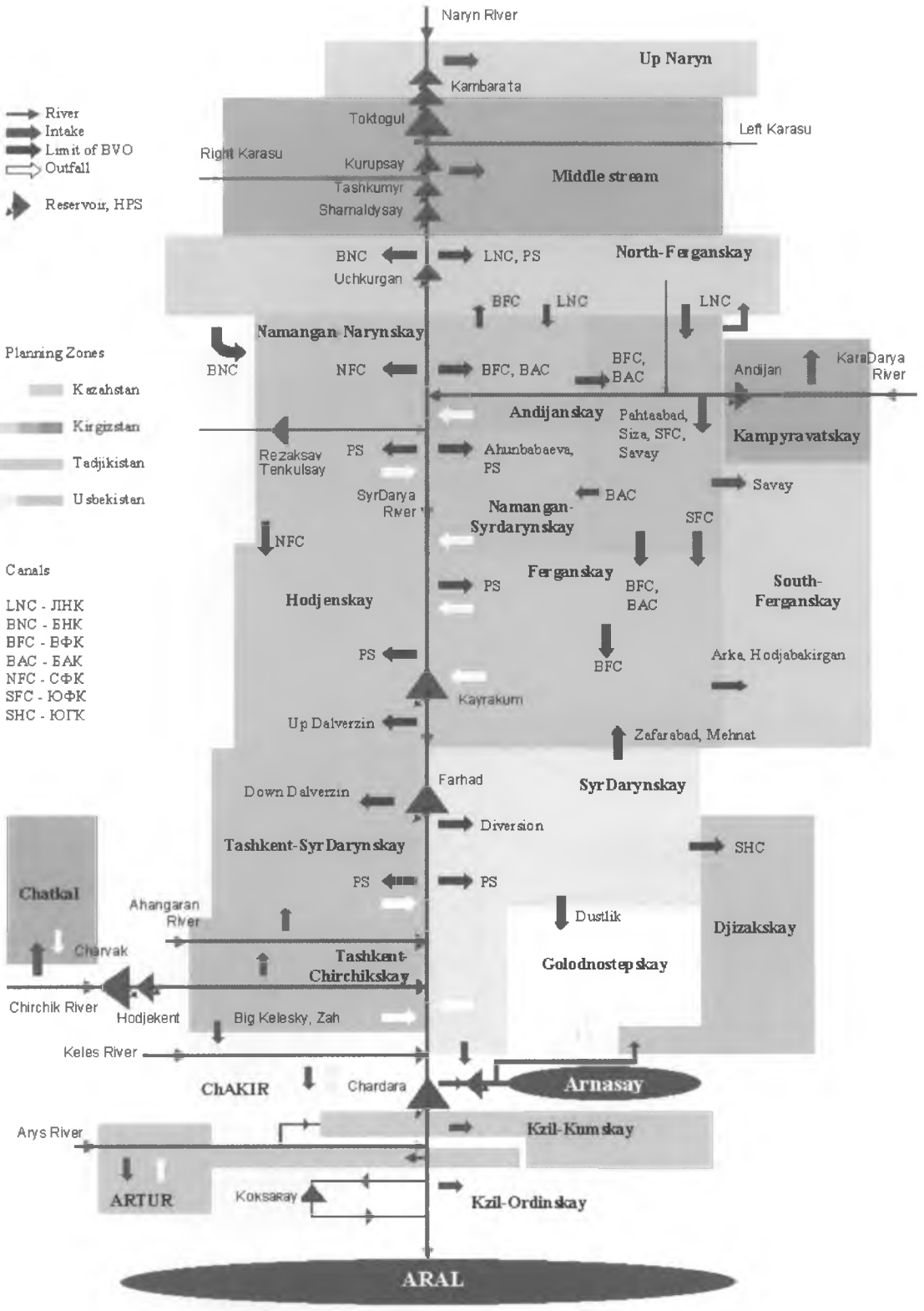
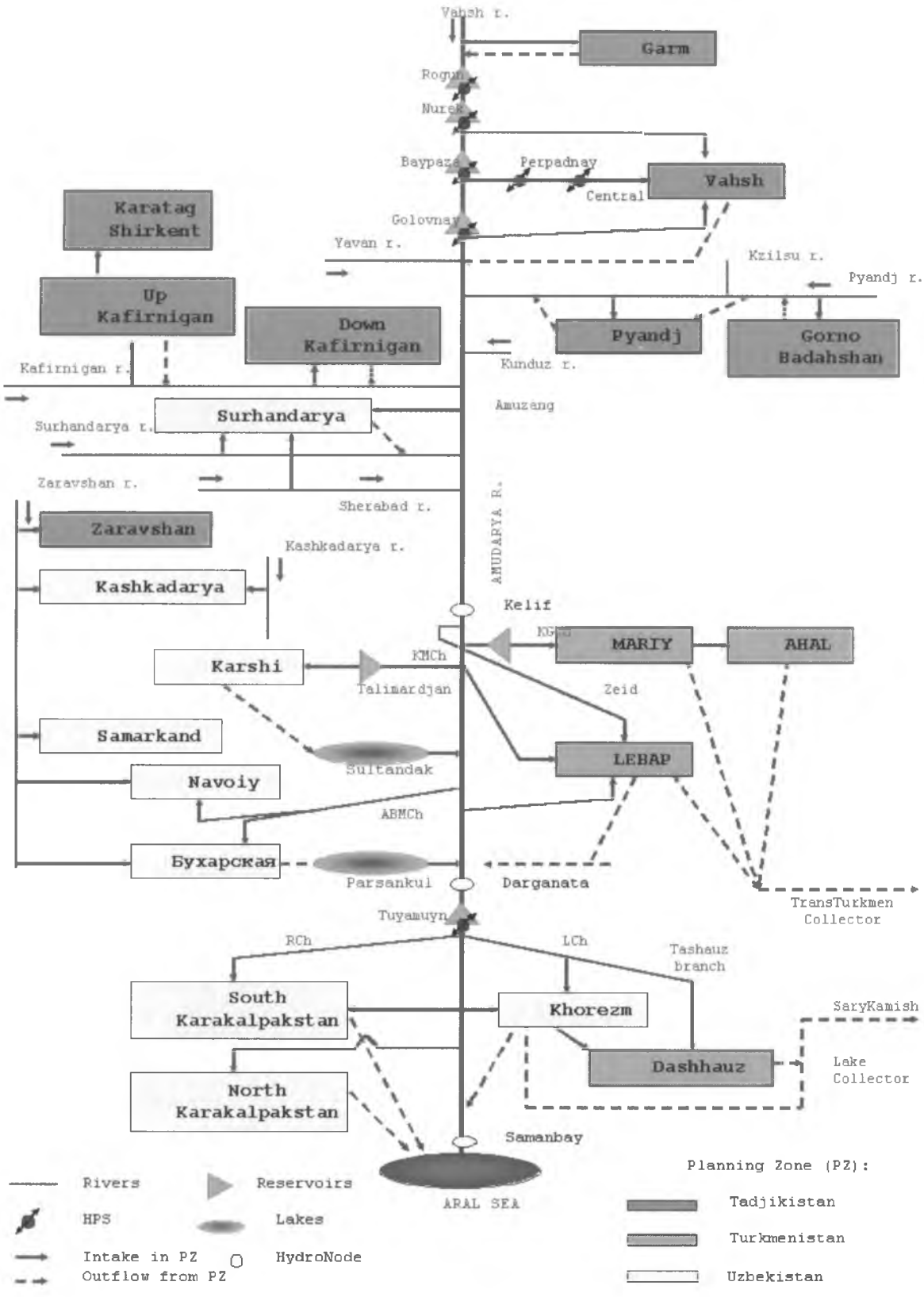


Syr Darya River Linear Scheme
http://www.cawater-info.net/i/syrdarya_large.gif
[Download: May 15, 2009]



Amu Darya River Linear Scheme
http://www.cawater-info.net/i/amudarya_large.gif
[Download May 15, 2009]

TEZE MAGISTERSKÉ DIPLOMNÍ PRÁCE

Jméno:
Zuzana Kopajová

E-mail:
zukopaj@gmail.com

Semestr:
letný

Akademický rok:
2007/08

Obor:
Ruské a Východoevropské Studie

Název práce:
The Factor of Water in Central Asia

Předpokládaný termín dokončení (semestr, školní rok):
letný, 2008/09

Vedoucí diplomního semináře:
Doc. PhDr. Jiří Vykoukal

Vedoucí práce:
PhDr. Slavomír Horák

Zdůvodnění výběru tématu práce (10 řádek):

As a student of Russian and Eastern European studies I decided to dedicate my final thesis to the region of Central Asia and the topic The Factor of Water in Central Asia. At the institute, there has been an expert unit or rather an informal think-tank established that concentrates specifically on this region. In the curriculum we have several scholarly subjects that concentrate on various aspects of the Central Asian development and also the richness of the books and sources in the Jinonice library is perhaps unique in Central Europe. My consultant, Slavomír Horák, is a highly profiled specialist at Central Asian matters and the author of an influential book in the researched field. I believe his leading and my personal motivation, which has been even intensified after my repeated visits to the region (Kyrgyzstan 2005, Tajikistan 2006), will result in a satisfactory final thesis, possibly to be published or to help me shape my carrier path. I purposed a fairly specific topic, which will enable me to utilize the knowledge of theory of international relations on a case study and understand the wider context of the current world order. The Factor of Water is simultaneously rather stable and somehow timeless, and at the same time crucial and to be found a prompt solution to. The currently relevant topic will permit me to practice my language skills (English, Russian, German, Polish and Swedish) and facilitate me to form a detailed knowledge of the up-to-date events in the entire area.

Předpokládaný cíl (10 řádek):

The prerequisite aim of my thesis is to advance my analytical skills and teach me how to critically accumulate and approach primary as well as secondary sources of information. The methodology to be applicable will be set into the wider frame of the relatively new research approach of Environmental Security. If I, by chance, create an original solution of how to convert potential conflicts into cooperation, I could present this finding e.g. to The ENVSEC Initiative (Environment and Security, a common effort of UNEP, UNDP, OSCE, NATO, UNECE, REC) or ENCOP (Environment and conflicts project at the Centre of Security Studies), who offer internships and free vacancies. Further there is the alternative to receive a Ph. D Scholarship e. g. OSCE Academy Bishkek or Slavonic University in Tashkent.

The case study alone should examine the conditions for the post-Soviet Central Asia against the background of a worsening ecological situation. I would like to mainly focus on the inter-state water distribution disputes and the identification of the potential conflicts induced by ecological factors from local to international levels and the respective conflict management.

Základní charakteristika tématu (20 řádek):

As a region, Central Asia is subject to a number of major environmental concerns, including the desiccation of the Aral Sea, the depletion and degradation of the river and irrigation of water as a result of the Soviet and Chinese nuclear weapon testing at Semipalatinsk and Lop Nor, respectively.

The Central Asian region could be from Ancient times considered a hydraulic society, where as the "Mesopotamia" of the region served the fertile irrigated land between the two legendary rivers of Oxus (Amu Darya) and Jaxartes (Syr Daria). With the fall of the Soviet empire a new international river basin emerged in Central Asia – Aral see basin, where the process of decolonisation and nation-building meet simultaneously with the need to substitute the previously centrally directed water management system with a new order. "The postulated sovereignty over own resources of the different republics is contradictory to the internationalization of the Aral hydrological basin."

From the perspecitve of the concept of environmental security, the ecological catastrophe has enormous social implications (contamination of water, health problems, infant mortality, economical losses of production, unemploynement, migration, changes of microclimate). I will however highlight the political aspects of cooperation or conflict in the inter-state interactions. Is a common water management the preferable option on a bilateral, regional or international level? How are the post-Soviet regional groupings managing to deal with the environmental factors of the regions security? Is the factor of water vulnerability underestimated and overshadowed by e.g. the geopolitics of oil in the Central Asia region? That will be the field of my research in the final thesis: The Factor of Water in Central Asia.

Předpokládaná struktura práce (15 řádek):

1. The Concept of Environmental Security

1. 1 Agenda of Environmental Security

1. 2 Subjects of Security and Reference Objects

1. 3 Logics of Threats and Vulnerability

1. 4 Regionalizing dynamics?

2. Regional Cooperation vs. Regional Conflict

2. 1 Transforming Risks into Cooperation (Water Insecurity in Central Asia)

2. 2 Post Soviet Integration Groupings and Regional Initiatives in Water Crisis

2. 3 Foreign Interests in Central Asia and External Initiatives of Water Management Crises

3. Study Case: The Water Crises in Central Asia

3. 1 Environmental Degradation (Eco-geographical setting, Hydrological basin of the Aral Sea region, Impoverishment of living space, Regional Climate)

3. 2 The Social Effects of Environmental Degradation (Economic problems, Health impact, Population displacement)

3. 3 Environmentally Induced Conflicts in Central Asia (Proneness to conflicts, Water-related conflicts in the Aral Sea basin, Geopolitical implications)

3. 4 Approaches to peaceful conflict management (Interstate relations, Solutions to alleviate social effects, Water conflict management in Central Asia, Prospects)

Základní prameny a literatura (20 nejdůležitějších titulů včetně lokace):

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2. BARNETT. J.: The Meaning of Environmental Security. Zed Books, London 2005.</td></tr>
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