

# Charles University

Faculty of Social Sciences

Institute of Political Studies



Jakub Landovský

## Conflict and Cooperation in Transboundary Watersheds

*Dissertation*

Prague 2011

Author: **PhDr. Jakub Landovský**

Consultant: **Doc. PhDr. Bořivoj Hnízdo, PhD.**

Opponent:

Opponent:

Date of Defence: **2011**

## **Acknowledgment**

I am especially grateful to Doc, PhDr. Bořivoj Hnízdo, PhD., for all his comments and constructive criticism during my academic years. I am also grateful to Prof. Aaron t. Wolf, for his wisdom and determination as well as for the opportunity to participate in the internationally based research team on the watershed conflicts during my Fulbright Scholarship in the USA. I am also grateful to the UNDP for the participation and publishing possibility in the frame of their internationally recognized publishings.

## **Declaration**

“Hereby I declare that this submission is my own work and that to the best of my knowledge and belief it contains nothing which is the outcome of work done in collaboration with others, except as specified in the text and where due acknowledgement has been made.”

---

**PhDr., Mgr. Jakub Landovský**

**Bibliographical reference:** LANDOVSKÝ, Jakub. *Conflict and Cooperation in Transboundary Watersheds*. Praha: Univerzita Karlova v Praze, Fakulta sociálních věd, katedra politologie, 2011. Vedoucí diplomové práce Doc. PhDr. Bořivoj Hnízdo PhD.

### **Keywords**

water, water conflict, international water law

## **Abstract**

The following thesis deals with the conflict and cooperation in transboundary watersheds resources. The burgeoning debate on the theme is revolving the quantitative evidence of prevailing cooperation over the conflict from the distant history to the present times. The statistical analysis of water events from the years 1949-2000 in the 263 transboundary watersheds convinced the scientific community, that states tend to cooperate over water more than dispute, but the explications for such outcomes were scarce and did not gain unequivocal peer acceptance. Focus in the field study of water conflict and cooperation shifted to water institutions studies, without abandoning methods of quantitative analysis. The author focuses on the structural spatial and temporal analysis of five watersheds on three continents. The case studies include: the Ganges-Brahmaputra-Meghna watershed, the Danube River, the Aral Sea endorheic catchment area, the Mekong watershed and the Euphrates and Tigris watershed. Water institutions are understood as interconnected structures based on international treaties. With the global international water law regime being able to give only a general guidance and distinguish between legal and illegal acts of states, the main institutional capacity lies in the basin's specific institutional framework. Principal focus is therefore on watersheds institutional framework, which is perceived as interconnected structure capable of reacting to external impulses. Biophysical, socioeconomic and geopolitical inputs are identified in each watershed. These dynamic entities known as watershed stressors are then compared with the current institutional capacities vested in the international treaties. Dynamic understanding of the watershed changes and unique methodology to evaluate institutional framework capacity and resilience are the most valuable contributions of this thesis. Concluding recommendations for increasing institutional capacities are distilled from the case studies.

## **Abstrakt**

Disertační práce *Conflict and cooperation in international watersheds* si klade za cíl zhodnotit instituce, mechanismy a pravidla týkající se vodních zdrojů sdílených více státy. Analýza dat týkajících se vodních zdrojů z 263 mezinárodních povodí z období 1949-2000 prokázala vysokou převahu kooperativních událostí nad konflikty. Mezinárodní instituce, včetně mezinárodních smluv, hrají v procesu transformace konfliktů podstatnou roli. Tato dizertace přináší podrobné poznatky o institucionálních aranžmá v pěti mezinárodních povodích, mezi něž patří: Ganga-Brahmaputra-Meghna, Dunaj, Eufrat a Tigris (Shatt-al-Arab), Mekong a povodí Aralského jezera. Předkládaná práce chápe instituce v mezinárodních povodích jako systémově propojené celky, jejichž základem jsou vždy mezinárodní smlouvy. Obecná pravidla mezinárodního práva veřejného upravující mezinárodní vodní zdroje dávají základní odpověď na otázku, zda je jednání států v souladu s mezinárodním právem či nikoliv. Nejsou ovšem schopny řešit konkrétní problémy. Každá změna biofyzikálních, socioekonomických a geograficko-politických parametrů je automaticky přenášena na ostatní uživatele vodního toku. Povodně, sucha, fluktuace toku, znečištění, změny v důsledku stavby přehrad, plavebních i zavlažovacích kanálů, působí často daleko za hranicemi států, kde vznikly. To klade značné nároky na fungování mezinárodních institucí v dané oblasti. Dosud nebyla provedena analýza struktury mechanismů spolupráce v mezinárodních povodích z hlediska schopnosti reagovat na biofyzikální, socioekonomické a geopolitické změny. Dynamické chápání jednotlivých dějů a jejich porovnávání s institucionální kapacitou povodí je hlavním přínosem této dizertační práce. Dále je poskytnut vhled do fungování systému mezinárodního práva, na globální úrovni a jsou identifikovány hlavní obyčejové normy mezinárodního práva veřejného. V závěru jsou doporučení pro zvýšení institucionální kapacity v konkrétních povodích. Problematika vzájemných závislostí je řešena rámci případových studií.

## List of Acronyms

ADB	Asian Development Bank
CAS	Complex Adaptive System
DRPC	Convention on Cooperation for the Protection and Sustainable Use of the Danube River
EIA	Environmental Impact Assessment
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GAP	South-eastern Anatolia Project (Güneydoğu Anadolu Projesi)
GBM	Ganges-Brahmaputra-Mengha
GDP	Gross Domestic Product
GMS	Greater Mekong Sub-region
IBRD	International Bank for Reconstruction and Development
ICAS	Interstate Council for the Aral Sea
ICJ	International Court of Justice
ICPRD	International Commission for the Protection of the Danube River
IFAS	International Fund for Saving the Aral Sea
IHA	International Hydropower Association
ILA	International Law Association
ILC	International Law Commission
IMC	Interim Mekong Committee
IUCN	International Union for Conservation of Nature
IWA	International Water Association
IWRM	Integrated Water Resources Management
JBIC	Japan Bank for International Cooperation
LHWP	Lesotho Highland Water Project
MC	Mekong River Committee
MRC	Mekong River Commission
MRC	Mekong River Commission
OECD	The Organization for Economic Co-operation and Development
PIANC	Permanent International Association of Navigation Congresses

QEC	Quadripartite Economic Cooperation
RBO	River basin organization
TFDD	Transboundry Freshwater Dispute Database
TRWR	Total renewable water resources
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Program
USSR	Union of Soviet Socialist Republics
WB	World Bank
WCD	World Commission on Dams
WRI	World Resources Institute

## List of Tables

Table 1: Use of the Principle of Equitable and Reasonable Utilization in international water treaties 1980-2003 .....	52
Table 2: Use of the principle of Sustainable water use in international water treaties 1980-2003.....	53
Table 3: Use of the principle of No significant harm rule in international water treaties 1980-2003 .....	53
Table 4: Use of the principle of Prior notification in international water treaties 1980-2003 .....	54
Table 5: Country areas of the Danube Basin.....	59
Table 6: International water treaties on the Danube River .....	66
Table 7: Unilateral variants for finishing Gabčíkovo-Nagymaros .....	70
Table 8: Country Areas in the Ganges-Brahmaputra-Meghna River Basin.....	94
Table 9: Chronology of Main Water Treaties between India and Nepal .....	103
Table 10: Ganges river allocations.....	120
Table 11: Country areas of the Mekong River Basin.....	123
Table 12: Country areas in the Aral Sea Basin .....	130
Table 13: Country areas in the Euphrates-Tigris River Basin .....	137
Table 14: Colonial agreements on Euphrates and Tigris.....	145
Table 15: Treaties in Euphrates and Tigris basin .....	150

## Table of Contents

Acknowledgment.....	3
Declaration .....	4
Keywords.....	5
Abstract .....	6
Abstrakt.....	7
List of Acronyms .....	8
List of Tables.....	10
1 Introduction and literature review.....	16
1.1 Review of Literature.....	16
1.1.1 Human security debate.....	19
1.1.2 Environmental Sciences Debate.....	20
1.1.3 Vulnerability, Resilience of the Biophysical and Socioeconomic Systems.....	21
1.2 Structure and style .....	21
2 Methodology and aims .....	23
2.1 The scope of the thesis .....	23
2.2 Definitions of Key Terms.....	27
2.3 Water stressors theory .....	29
2.3.1 How to evaluate water institutions.....	31
2.3.2 Geopolitical stressors .....	32
2.3.3 Socio-economical stressors .....	33
2.3.4 Biophysical stressor .....	33
2.4 Aims of the thesis.....	34
2.4.1 Survey of the global international water regime .....	35
2.4.2 Survey of the selected watersheds .....	35
3 Evolution of International Water Law .....	37
3.1 Sources of international water law.....	37
3.2 Emergence of an customary water law .....	39
3.3 Coercion in International law.....	43
3.4 Evolution of doctrines and principles of international water law .....	44
3.4.1 Harmon Doctrine (Absolute Territorial Sovereignty).....	44
3.4.2 Absolute Riverine Integrity .....	44
3.4.3 Prior appropriation .....	45
3.4.4 Doctrine of Limited Territorial Sovereignty and Limited Integrity of the River .....	45
3.4.5 Persistent objector doctrine .....	45
3.4.6 Rivers as borders between states .....	46
3.5 Milestones in the Codification of international water law .....	47
3.5.1 Helsinki Rules .....	48
3.5.2 Berlin Rules.....	49
3.5.3 1997 Convention on the Law of Non-Navigational Uses of International Watercourses	

3.6	Contemporary principles of international water law .....	51
3.6.1	The Principle of Equitable and Reasonable Utilization.....	51
3.6.2	The Principle of Sustainable Water Use .....	52
3.6.3	“No significant harm” rule .....	53
3.6.4	The principle of prior notification .....	54
3.7	Discussion on the law of International water sources .....	55
4	The Danube River .....	58
4.1	The History of Conflict and Cooperation on Danube.....	60
4.1.1	Danube 1616 - 1948.....	61
4.1.2	Period 1948 – 1989 .....	64
4.1.3	Soviet Domination on 1948 Danube Commission .....	64
4.1.4	Judgement of the ICJ in Gabčíkovo-Nagymaros Case .....	74
4.2	Contemporary Institutional Framework on the Danube.....	79
4.2.1	The Danube Commission .....	79
4.2.2	The International Commission for the Protection of the Danube River .....	80
4.2.3	European Framework Water Directive .....	82
4.2.4	Public Participation .....	83
4.2.5	Summary .....	83
4.3	Geopolitical Stressors .....	84
4.4	Biophysical Stressors.....	86
4.4.1	Pollution .....	86
4.4.2	Siltation and Pollution Deposits in Large Dams.....	86
4.4.3	Environmental Damage as a Consequence of Military Action or Industrial Incidents .....	87
4.4.4	Gradual Changes Affecting Riverine Ecosystems.....	87
4.4.5	Floods.....	88
4.5	Socioeconomic Stressors.....	88
4.6	Danube Partial Conclusions.....	89
4.6.1	Shift of Cooperation Focus .....	89
4.6.2	Structural Analysis.....	90
4.6.3	Addressing the Stressors .....	90
5	The Ganges-Brahmaputra-Mengha.....	92
5.1	Physical Geography and Human Geography.....	92
5.2	Evolution of Water Law on the Indian Subcontinent .....	94
5.2.1	Water Rules and Decline of the Harrapan Civilisation.....	94
5.2.2	Mauryan Water Rule System .....	96
5.2.3	On the Way to Modernity.....	99
5.2.4	India and Nepal.....	101
5.2.5	India and Bangladesh .....	108
5.3	Geopolitical Stressors .....	110
5.3.1	Disintegration of the British Empire .....	110
5.3.2	Significant Power Asymmetry.....	111

5.3.3	Critical Water Control Infrastructure out of National Borders.....	111
5.3.4	Internal Political Instability.....	112
5.3.5	Nationalism and Religion.....	112
5.3.6	Unresolved Boundary Issues .....	113
5.4	Socio-economical stressors .....	113
5.4.1	Water Quality Issues .....	114
5.4.2	Hydropower Potential vs. Increased Demand for Electricity .....	114
5.4.3	Neglected Water Needs of Tibet.....	115
5.5	Biophysical Stressors.....	115
5.5.1	Seasonal Variability of Flow .....	115
5.5.2	Flood and Drought .....	115
5.5.3	Climate Change Effects.....	116
5.6	Analysis of the Institutions in the Ganges-Brahmaputra-Meghna.....	116
5.6.1	Bhutan and India.....	117
5.6.2	Nepal and India.....	117
5.6.3	Bangladesh – India.....	119
5.7	Partial Conclusions Ganges-Brahmaputra-Meghna .....	121
5.7.1	Structural resilience .....	121
5.7.2	Responsiveness to present stressors:.....	122
6	Mekong.....	123
6.1	Cooperation in the Mekong sub-region.....	123
6.1.1	Mekong River Committee .....	124
6.1.2	Mekong River Commission .....	125
6.1.3	The Greater Mekong Sub-region.....	125
6.1.4	The Quadripartite Economic Cooperation.....	125
6.2	Biophysical stressors .....	127
6.3	Geopolitical stressors.....	127
6.4	Socio-economical stressors .....	127
6.5	Partial conclusions .....	128
7	Aral Sea Basin.....	130
7.1	<b>Watershed geography and climate .....</b>	<b>130</b>
7.2	Development of the Aral basin Institutional framework:.....	131
7.3	Toktogul dispute.....	132
7.4	Biophysical stressors .....	132
7.4.1	Salinization due to intensive irrigation.....	132
7.4.2	Pollution .....	133
7.4.3	Climate Change.....	133
7.5	Geopolitical stressors.....	134
7.6	Socioeconomic stressors .....	134
7.7	Partial conclusions .....	134
8	Euphrates-Tigris.....	136

<b>8.1</b>	<b>Watershed geography and climate</b> .....	136
8.2	Evolution of institutional framework.....	138
8.2.1	Excursion to the Law of ancient civilisations in Mesopotamia .....	138
8.2.2	Introduction to Islamic Law .....	140
8.2.3	The sources of Sharia .....	141
8.2.4	Sharia and ownership of water .....	142
8.2.5	Relationship between Sharia and system of international law .....	143
8.2.6	Colonial Agreements on Euphrates and Tigris.....	144
8.2.7	Modern water disputes.....	146
8.2.8	Tabqa Dam dispute .....	148
8.2.9	South Eastern Anatolia project.....	148
8.3	Contemporary Institutional Capacities of Euphrates and Tigris basin.....	150
8.3.1	Biophysical stressors .....	152
8.3.2	Socioeconomic stressors.....	153
8.3.3	Geopolitical stressors .....	154
8.4	Discussion and partial conclusions.....	155
9	Conclusions .....	159
9.1	Discussion on general rules of international water law .....	159
9.2	Lessons learned from the case studies .....	160
9.2.1	The Danube Case study.....	160
9.2.2	Ganges-Brahmaputra-Meghna.....	162
9.2.3	Euphrates and Tigris (Shatt-Al-Arab).....	164
9.2.4	Mekong.....	165
9.2.5	The Aral Sea Case.....	166
9.3	The Final Remark.....	167
10	List of References .....	168

# Part I.

## **1 Introduction and literature review**

The total quantity of water in the world is immense, but it is mostly saltwater (97.5%) or water locked in ice caps (1.75%). The amount of economically available water for human use is only 0.007% of the total (about 13,500 km<sup>3</sup>), which is about 2300 m<sup>3</sup> per capitam. That would be enough for human consumption, agricultural and industrial use if the water was evenly distributed in time and space. The problem is that water is not evenly distributed in space and it fluctuates widely in time. The variations in flow are stochastic and there is a great degree of uncertainty for the future water availability. The uncertainty is increased by the fact, that majority of water sources are shared by two or more countries. Today 148 countries are sharing 274 river basins with population of 2.748 billion people (Wolf, 2007). Water is fuelling many facets of the human society and is indispensable for sustaining aquatic ecosystems that are supporting human development. *It is also the most politicized natural resource. When water becomes scarce, its political salience inevitably rises and the likelihood of domestic unrest increases* (Elhance, 1999).

Fortunately the human civilization developed water institutions and technology to address water problems and transform potential water conflicts into water cooperation. This dissertation focuses particularly on transboundary water institutions. They can be defined as persistent and predictable arrangements such as treaties, laws, or organizational structures dealing with transboundary water resources.

Sharing of water resources between sovereign states is attracting attention of scholars from various fields and a growing body of academic literature is inquiring examples transboundary water conflict and cooperation from perspective of international relations, environmental science, geopolitics, international law and economics.

### **1.1 Review of Literature**

This review of literature covers only last 30 years with some exemption regarding international law literature and environmental determinism debate. The vast body of literature in the field of water conflict and cooperation studies can be divided according to

temporal, spatial, language and disciplinary axis. Most of the literature is in English and minor portion is in French usually available in English translation.

There was plethora of water law literature written from a narrow point of view. (Griffin, 1959; Keller & Kalff, 1967; Zisgen, 1962) First monographic book about conflict and cooperation in international watersheds was called *International Rivers: The politics of cooperation* and the author was David LeMarquand in 1977.

After LeMarquand prodigal opening study scientists from various fields including: law (Dellapenna, 2001a; McCaffrey, 1999; Shaw, 2008; Wouters, 1993), economy (J. A. Allan, 2002; A. Dinar & Saleth, 1999; Fisher, Huber-Lee, & Amir, 2005; Sagoff, 2008) geosciences<sup>1</sup> (Ahmad et al., 2000; Flint, 2006; Glassner, 1996; Wolf, 2007), history (Butzer, 1976; Cosgrove, 2003; Wittfogel, 1957) and environmental sciences (Gunderson, Holling, Pritchard, G. D. Peterson, & Munn, 2002). Mainstream general debate over water resources conflict and cooperation had at least three development stages.

First scientific generation could be called alarmists. They had accomplished to attract the attention of decision makers and general public, but they failed to give scientific insight into the salient water issues at hand. The attention of decision makers, especially from International organizations community, helped to get the research funds, but at the same time it led to oversimplification and unnecessary exaggeration of their hypothesis: that the water scarcity leads to violent conflict. Some still insist, that competition over scarce resources will lead to strong political tensions and to even to war (Westing, 1986). Others, like Homer-Dixon, carefully distinguish between renewable and non renewable resources and assign more conflict potential to the non-renewable resources like oil or strategic ores. Nevertheless, if Homer-Dixon had to assign one renewable resource that will cause an international conflict, it will be almost certainly water in the international rivers (Homer-Dixon, 1999). Other authors find the history full of water conflict and offer Jordan, Nile and Euphrates-Tigris as examples (Samson & Charrier, 1997). Others point out, that there has

---

<sup>1</sup> This category include: physical geography, human geography, political geography and geopolitics

not been a single water war and majority of violent events happened exclusively between Israel and its neighbours (Wolf, Natharius, Danielson, Ward, & Pender, 1999).

The second generation of researchers relied more on statistical analysis of global datasets. They brought hardly rebuttable evidence that cooperation considerably prevails over conflict. The group of scientist from Oregon State University created dataset of 264 international river basins under the project of Transboundary Freshwater Dispute Database (TFDD).<sup>2</sup> Methodology and guidelines for basin selection was described in (Wolf et al., 1999). Authors expanded the database with conflictive and cooperative events between states in the international watersheds. They have discovered that out of 1831 water related events from the years 1948 – 1999: 1228 events were cooperative, 507 conflictive and 96 were considered neutral. (Wolf, Yoffe, & Mark Giordano, 2003). In the group of conflictive events only 37 involved any form of violence, all below the threshold of interstate war.(Uitto & Wolf, 2002; Wolf, 2007; Wolf et al., 2003; Yoffe & Wolf, 1999)

Account of water related cooperation included 450 water related treaties in 109 out of the 263 international river basins. In 62 watersheds the cooperation was institutionalized even further through the establishment of River Basin Organisations (RBO) (Meredith a Giordano & Wolf, 2003). The database was updated in 2010 confirming the trends discovered in 2000.(Stefano, Duncan, S. Dinar, & Stahl, 2010).

It is apparent that alarmists were overestimating link between water scarcity and violent international conflict. But the dualism in water studies continued. With *water war nexus* thesis unsupported by empirical evidence and with the absence of major interstate water conflicts in the world system of international relations after the Cold war, the alarmist literature vanished. More and more evidence in favour of the cooperative potential of water including lack of historical support of water related wars occurred. Strategic considerations of high costs of military operations and occupation to relatively low cost of water resources were also discussed.

---

<sup>2</sup> The Transboundary Freshwater Dispute Database [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL: <http://www.transboundarywaters.orst.edu/database/>

Some authors (Elhance, 1999; Jägerskog, 2003; Uitto & Wolf, 2002) supported their research with theoretical arguments deriving from their case studies. Olga Baeva found out, that in the years 1996 -2001 more than 40 percent of case studies were focused on Middle East Rivers (Baeva, 2002).

Despite of enthusiasm from the above breakthrough discoveries the discussion about water conflict and cooperation started to lose pace. Nobody was able to explain:

1. Why the cooperation prevails on the global scale?
2. Why the level of cooperation does not correlate directly with low likelihood of conflicts?
3. Why in some watershed institutions are so inefficient in preventing environmental degradation or socio-economic problems?

Dinar proposed, that *the emergence of cooperation mechanisms over shared water will be greatest when scarcity is moderate, rather than very low or high*(S. Dinar, 2009). Some researchers focused on water institutions and came up with interesting but merely partial conclusions. Wolf emphasizes the resilience of water institutions recalling examples like Indus Water Commission and Mekong River commission. On one hand these institutions survived intensive military conflicts between their member states, but on the other hand the long negotiation periods preceded their establishment. *The Ganges took almost 30 years to conclude, and the Jordan 40—and, all the while, water quality and quantity degrades to where the health of dependent populations and ecosystems are damaged or destroyed...one rarely hears talk about the ecosystems of the lower Nile, the lower Jordan, or the tributaries of the Aral Sea; they have effectively been written off to the vagaries of human intractability*(Wolf, 2007).

### **1.1.1 Human security debate**

On the background of this data driven debate, the understanding of human security issues has changed profoundly. Gleick published numerous examples of internal water conflicts and small scale violence. These include targeting of water installations by terrorist groups and other forms of violence not directly water related but surely detrimental for affected

populations. (Peter H. Gleick, 1993, 2003) This led to an assumption that water scarcity or misdistribution is a threat to *human security* conceptualized in the early 90s.

Scientists influenced by Malthusian paradigm focused on the dynamics of population growth and decreasing water availability. The alarmist outcomes about inevitable water conflicts were exacerbated by unfounded announcement of foremost statesman and eminent leaders of international organizations. The World Bank vice-president Ismail Serageldin said that the next war would be fought over water. (Barnaby, 2009) Anvar Sadat statements aiming to restrain Ethiopian plans for irrigation were also used to attract attention, but they were totally irrelevant to the scholarly debate. *Violence over water does not seem strategically rational, hydrographically effective, or economically viable.*(Wolf, 2007)

### **1.1.2 Environmental Sciences Debate**

Hardin points out in his original article *The Tragedy of the Commons* that human societies consisting of rational and selfish individuals will ultimately deplete shared resource, even though it is not in anyone long term interest. (Hardin, 1968) Water is a renewable resource, but over pumping of shared transboundary aquifers from both side of the border will ultimately deplete the aquifer completely. The competition of human beings is often more effective, than ability of ecosystem to replenish.

The idea of equilibrium will be employed frequently in this thesis. There are more examples of detrimental effects of this concept in (Leal, 1998). Hardin's experiments are based on then popular and still influential *game theory*. This discipline has a lot of untapped theoretical tools, which could contribute to the better understanding of conflict and cooperation in the international watersheds. Many times discussed Axelrod's prisoner's dilemma will be mentioned this dissertation (Axelrod, 1997).

Impact of the environmental debate on the conflict and water cooperation studies could be seen in the work of Toronto group including Homer-Dixon, who hypothesizes about links between environmental scarcity degradation and conflicts (Homer-Dixon, 1999).

Water institutions belong to many factors responsible for sustainable use of a shared transboundary resource. Sustainability refers to the *persistence and structure of any system;*

*the concept is thus of central interest to both ecologists and policy analysts who study resource use.*(Costanza, Low, Ostrom, & Wilson, 2001). Even though sustainability is a widely used term, it is rather difficult to. Assessment of sustainability always faces **uncertainty**. Discussion about of global climate change is the most obvious example. Policy makers are demanding certain answers from the scientific community to form their policies, but there are no definitive answers regarding future. Sustainability defined as development that *fulfils the need of current generation, while not sacrificing needs of generations to come*<sup>3</sup> desperately need to forecast needs of future generations.

### **1.1.3 Vulnerability, Resilience of the Biophysical and Socioeconomic Systems**

Concepts of resilience and vulnerability related to water resources are often assessed within the framework of sustainability and relate to the ability of biophysical systems to adapt the change. (Wolf, 2007) Terminology is mostly borrowed from the discourse of complex adaptive systems (Erdi, 2008; Mitchell, 2009) or from sustainability discourse in environmental science (Gunderson et al., 2002)

The general assumption is that human systems and ecosystems are interconnected. They are to some degree resilient to change and maintain their systems in equilibrium. When the change overcomes the capacity threshold of the social system or ecosystem, then the reaction of the system is reorganization and a new equilibrium is established.

## **1.2 Structure and style**

This thesis is written according to the norms required by Charles University – Faculty of Social Sciences. When no clear style guide is available, international standards were used. Citations are according to the ISO 690-2, chapters are numbered according to ISO 2145 and quantities and units are in compliance with ISO 31. Older style of Roman numerals

---

<sup>3</sup> Our Common Future, Report of the World Commission on Environment and Development, World Commission on Environment and Development, 1987. Published as Annex to General Assembly document A/42/427, Development and International Co-operation: Environment August 2, 1987. [online] 200-11- [accessed 04 August 2011] available on-line: <http://www.un-documents.net/wced-ocf.htm>

numbering of *front matter pages*<sup>4</sup> pages was abandoned, because it may confuse electronic viewers. Hence this document is numbered from the first page continuously.

Citations of older international treaties, posed a serious problem. The newer treaties were either in United Nations Treaty Collection (UNTC) or in Transboundary Fresh Water Database of Oregon State University (TFDD). Even though only UNTC is authoritative source of international law treaties, they are both reliable.

The dissertation is structured into four parts. First being this introduction. Second part deals with the methodology and specific aims of the dissertation, and then follows the analysis of the general public international laws pertaining to transboundary water resources. The third part is starting with the case study of Danube. The reason for that is to immediately utilize the knowledge from the previous section, since one of the major conflicts – Gabčíkov-Nagymaros dam dispute is rather complicated matter of international law. Other case studied follows. Ganges-Brahmaputra-Meghna case study broadens the debate on environmental determinism and presents some of the oldest rules governing shared water resources. Mekong case study is more shifted towards the analysis of the cooperation framework and the resiliency of water institutions, which have worked even in the times of armed conflicts. Aral Sea basin is representing severe biophysical, socioeconomic and geopolitical stressors and their feedback connections. It is an example of basin after disintegration of central authority with legacy of unsustainable agricultural practices and incredible environmental problems including chemical, biological and even nuclear pollution. The last example is getting back to the place which is the cradle of the civilization. Fertile Crescent is now divided between states with predominantly Muslim population and therefore an excursion to water rules of Sharia is included. The conclusion will present the most important findings is a result oriented discussion.

---

<sup>4</sup> title, key words, abstract, glossary, table of contents and lists of figures

## **2 Methodology and aims**

This dissertation chooses innovative methods. Even though the author was the the research group member from Oregon State University, he decided to try to move on with a different approach.

Spatial and temporal analysis of institutional frameworks is used instead of quantitative statistical analysis of their number. Statistical comparison is used only for presenting occurrence of emergent principles of international customary law in the dataset of 74 international water treaties. Statistical approach taking into account only the number of the treaties in the basin disregarding their structure, content and applicability, usability and resilience yielded inconclusive results. Decision to utilize this methodical and comprehensive study of water institutions was made and five examples of transboundary were chosen at the preparatory stage. This dissertation contains case studies from the Danube, the Ganges-Brahmaputra-Meghna, the Euphrates and Tigris and the Mekong.

Gradual fragmentation of science approaches made the holistic method to interdisciplinary problems highly problematic, but not impossible. The studies of water or other natural phenomena is crossing the borders of disciplines. They are overwhelmed by the multiplicity of methods, principles and approaches from many different fields offering different perspectives: climatology, international law, economy, ecology, political geography and international relations. This thesis is proposing a method encompassing number of different fields without sacrificing their unique approaches and valuable results.

These problems from various fields will be divided into three categories. In compliance with the results of the Rio conference we have distinguished biophysical, socioeconomic and geopolitical problems and have clearly distinguished them in each case study.

### **2.1 The scope of the thesis**

Time and space scope of this thesis is defined easily. Timeframe is not limiting factor and conflictive events and cooperative arrangements from all epochs are examined according to their relevance.

It is a great advantage for institutional analysis of international watersheds to have a defined and comprehensive dataset of 450 treaties as well as an equally defined dataset of 264 international river basins. Out of this collection five river basins mentioned above were selected as typical examples.

From all the possible cooperative events, this thesis focuses only on water related rules in general and international water treaties in particular. These events do not need to be theoretically defined, because the rules this thesis examines are always found in primary sources mostly legal documents.

Legal research (i.e., the search for authority that can be applied to a given set of facts and issues"<sup>5</sup>) was the main method used: Primary legal resources were researched and analyzed. These resources cover the main legal issues in evidentiary practice and thus become the main focus of investigation. Most of this work has been built on consulting and synthesising international water treaties, judgements and decisions of the International court of Justice. It proved to an immense task to try to locate all potentially relevant primary sources within the numbers of applicable international water treaties. The biggest limitation of this type of work is that the development of law is a continuous process; hence the large part of research is devoted to definition and recognition of water related customs of international water law.

Secondary legal authorities, such as textbooks and legal journals, and legal were also used and are often referred the dissertation. The secondary sources such as codifications of the International Law Association and the International Law Commission were also relied upon in identifying of the latest trends in customary water law.

### ***2.1.1.1 Water related conflict***

Various definitions of water related conflict has been a substantial challenge. This dissertation brings to light numerous examples of water conflicts defined of water and discussed by the international water intellectual community.

---

<sup>5</sup> *University of Maryland research guide*. [online] University of Maryland webpage 2011-04 [accessed 04 August 2011] Available at: <http://www.law.umaryland.edu/marshall/researchguides/TMLLguide/intro.asp>

International watersheds are systems of interactions and competing interests. Water management is, by definition, a conflict management. *All water management is multi-objective and based on navigating competing interests. The chances of finding mutually acceptable solutions drop exponentially as more stakeholders are involved. Add international boundaries, and the chances decrease exponentially yet again.* (Wolf 2006)

Definition of conflict is vital but intricate task. Frederic Frey constructed following “power definition”: *[T]wo or more entities, one or more of which perceives a goal as being blocked by another entity, and power [of some sort] being exerted to overcome the perceived blockage* (Uitto & Wolf, 2002). Usage of power or violence is indispensable part of this definition, which reflects the etymology of the term from Latin verb *confligere* meaning: to strike together. Examples of such water conflicts would be numerous. Advantage of this definition for the purpose of identifying water conflicts is in the inclusion of goal and blockage of the goal by enemy entity. This leaves out numerous conflicts where water is used as a tool to get to non-water goal or as a military target in hostile activities seeking non water-related goals.

Peter H. Gleick, is one of the most prominent scientist and MacArthur fellow devoted to study of water conflict collected comprehensive list of 225 conflictive events related to water from 3000 BCE to 2010 AD.<sup>6</sup> Diverse conflicts such as those between assorted actors are covered by Gleick’s database. Some conflicts include water as a military tool, as in an example from Herodotus, when in 539 BCM Cyrus invades Babylon by diverting the Euphrates above the city and marching troops along the dry riverbed. (Hatami & Peter H. Gleick, 1994). Another example from history would be the plan of Leonardo da Vinci and Niccolo Machiavelli to divert river Arno away from besieged town, to take over Pisa for the house of Medici in 1503. The plan was not accomplished.

The last record of water as a military tool is Saddam Husein’s campaign to suppress opposition to his government, Saddam Hussein reportedly poisons and drains the water supplies of southern Shiite Muslims, the Ma’dan. The marshes of southern Iraq are

---

<sup>6</sup> The MacArthur Fellows Program is an award given by the John D. and Catherine T. MacArthur Foundation each year to those, who “show exceptional merit and promise for continued and enhanced creative work.”

intentionally targeted. The European Parliament and UN Human Rights Commission deplore the use of water as a weapon in the region.(Peter H. Gleick, 1993). All the above will be excluded from thesis, because water is merely a tool and not a goal in the above mentioned conflicts. The same approach will be applied to all other categories in the Gleick's collection, where water is a subject to terrorism, tool to gain political leverage or goal in historically undocumented religious accounts. From 225 entries only 5 have got water as the goal. One of the five entries is particularly interesting. It is a bloodless coup by Lesotho's defense forces, with support from South Africa, leading to immediate agreement with South Africa on the water resources from the Highlands of Lesotho, after 30 previous years of unsuccessful negotiations. (Baillat, 2004)

But how would be this event coded in the Transboundary fresh water dispute database of Oregon state university. The methodology is described in detail in the appropriate section of thesis. The event was described as major cooperative event and not as a conflict at all, which creates a conflict between`s database of Pacific Institute and database of Oregon state university. Both databases are methodologically sound and both have coded the event coherently. The problem is in the ambiguity of events compared to rigidity of the coding process. Another more subtle definition reflecting the conflict dynamics should be used in the course of this thesis. Professor of International relations Michael Nichols provides this definition of conflict:

...a conflict exists when two people wish to carry out acts which are mutually inconsistent. They may both want to do the same thing, such as eat the same apple, or they may want to do different things where the different things are mutually incompatible, such as when they both want to stay together but one wants to go to the cinema and the other to stay at home. A conflict is resolved when some mutually compatible set of actions is worked out. The definition of conflict can be extended from individuals to groups (such as states or nations), and more than two parties can be involved in the conflict. The principles remain the same.

Nichols identifies three stages in the conflict. First stage is latent and only different incompatible thought`s are existing in contestant`s minds. In the second phase the conflict materializes over a mutual goal or incompatible actions without reference to a tangible goal. This is the most interesting stage, because conflict and cooperation are both present as completely valid outcomes of the situation. The conflict is resolved by some mutually

compatible set of actions. This sounds as if only possible outcome of the conflict was a cooperative solution, but that is not true. Sometimes the true violence outbreaks and sometimes it solves the conflict. Nichols brings an example of conflict between Great Britain and Argentina, which went through phase of wanting the same territory of Falkland Island or Malvinas according to Argentinean military Junta. The latent conflict was there for decades and then both parties used their resources to coordinated effort to damage each other and seize the goal of the dispute. The key was in mutual compatibility. Example from water related military skirmishes could be the moving of a pumping station for Israeli National Water Carrier after Syrian attacks (Samson & Charrier, 1997). Both adversaries resorted to localized use of force, and both accepted the result of military action. Even though the conflict can bring a solution to the dispute, its adverse and disruptive impact on the fabric of cooperative network is outmatched by the value of the solution alone. For the sake of clarity dispute it will be used for first stage. The conflict or conflictive behavior will be associated with the second stage, including violence to overcome mutually incompatible goals or actions.

The rationale of the conflict prevention works with its potential laying in the water institutions as well as curbing mechanisms. The use of power is a problematic concept in the field of international law and international relations. It is forbidden under most circumstances by Charter of UN.

This lengthy definition conflict has two purposes. First purpose is to explain methodological problems, with describing water conflicts and caveats related to the use large databases of coded events. The second purpose is clearly demonstrated on the Lesotho Highlands Water Project showing that a case study put out of context gives very seldom a proper explanation.

## **2.2 Definitions of Key Terms**

**International water source** is any surface or underground freshwater body shared by two or more states. Transboundary water (source) is a more general term, which includes all water sources crossing any type of border, including: state border, administrative borders, borders of federal states, borders of sub-national units, Glassner works with terms international river and internationalized river. *International rivers* are identical to

international watershed in thesis and internationalized river are those that by treaty or other formal arrangement have been opened to navigation by vessels of signatories or even to vessels of other than riparian or signatory states. (Glassner, 1996).

Standard geographical terminology will be used, for description of Earth's surface units. Drainage basin, (watershed, catchment area, river basin) is defined geographically and legally as an area from which all the surface water flows to the common terminus, be it a seashore or inland water body. Those river basins flowing to freshwater or saltwater lake, swamp, wetland or other inland area are called endorheic watersheds. Example of endorheic watershed might be The Aral Sea or Okavango. Aral will be discussed in the case studies section and Okavango became a concern of a dispute between upstream Namibia preferring downstream Botswana. Upstream riparian wanted to use the water for irrigation and downstream riparian was afraid of potential revenue loss from ecotourism to unique Okavango delta, in case of decreased inflow.

**Sustainable system:** a sustainable system is a renewable system that survives for some specified (non-infinite) time.

**Emergence:** Emergence is the production of global patterns of behaviour by agents in a complex system interacting according to their own local rules of behaviour, without intending the global patterns of behaviour that come about. In emergence, global patterns cannot be predicted from the local rules of behaviour that produce them. To put it another way, global patterns cannot be reduced to individual behaviour.

**Perturbation:** Perturbation is an external stimulus, which has impact on the water institution. In this thesis perturbations are called stressors.

**Resilience:** Resilience is the ability to return to the steady state following a perturbation. (Gunderson et al., 2002)

**Hydropolitical vulnerability:** Hydropolitical vulnerability is the risk of political dispute over shared water systems

**River basin management:** Management of water resources, water-related resources and water-related development in a river basin.

**Subsidiarity** is the principle that a higher authority should only make decisions that cannot reasonably be made at a lower level. According to this line of thought, the water allocation within a river basin must reasonably be made for the basin as a whole, and hereby by an authority that covers the entire basin. At the same time, however, the operation of an irrigation scheme within the basin may be better undertaken at the scheme level

**Transboundary Water Institutions** or Water Institutions are persistent and predictable arrangements like treaties, laws, or organizational structures dealing with transboundary water resources.

### 2.3 Water stressors theory

Scholars studying international watersheds are in many cases overwhelmed by the number and diversity of many concurrent processes with intricate linkages happening at the same time. Reading through the scores of water literature one word is being used to describe this situation in the watershed more than the others. The word is adjective complex coming from the Latin root *plectere*: to weave, entwine. (Mitchell, 2009)

Even though the word *complex* occurs in a many articles (Daoudy, 2009; Stefano et al., 2010; Wouters, Vinogradov, A. Allan, Jones, & Rieu-clark, 2005), the concept have been used without reference to the complexity studies. It is referring to so called complex systems, which are central to the whole new interdisciplinary branch of science called complexity studies or complexity science. Complexity science strive to explain *how large numbers of relatively simple entities organize themselves, without the benefit of any central controller, into a collective whole that creates patterns, uses information, and, in some cases, evolves and learns.* (Mitchell, 2009)

Descriptive framework of complexity science will be used for describing of watershed's biophysical, sociological and geopolitical environment and response of watershed's institutions. *Biologists, sociologists, economists, and political scientists have faced the question of how such cooperation can arise among fundamentally selfish individuals. This is not only a question of science, but also of policy* (Mitchell, 2009) It is possible to foster conditions that will promote cooperation to arise and persist among different nations in order to deal water related problems summarized in this chapter., was also studied by

Robert Axelrod. He continued with his work based on strategies for playing iterated *prisoners dilemma* to answer *under what conditions will cooperation emerge in a world of egoists without central authority* (Axelrod, 1997)

The relations in each watershed are definitely complex. Inter-connections between riparians and are not simple or linear and we cannot understand the watershed as a sum of its components. (Waltz, 1979) States are still the most important pieces on the world chess board. The relevance of national governments is declining somewhat, even though the power to take action is still concentrated largely at that level. The states themselves are very complex systems and their attitude toward transboundary issues is a result of intricate political processes. This will be demonstrated Indo-Bangladeshi relations in Chapter 5. States are not capable of solving transboundary issues without cooperation and therefore they may surrender part of their sovereignty in favour of transboundary water institutions. The cooperation on the Danube is a salient example of institutional framework formation.

The second reason is the non-linear relation between causes and effects. Simple cause and effect relationships between inputs and outcomes are in fact very rare. A small change in a watershed may cause a large effect or no effect at all. Dam construction in China can influence biodiversity in Tonle-Sap Lake and take away the livelihood of Cambodian fisherman. Water diversion in the Khong Chi Moon project in Thailand can result in salinization of the Mekong delta which threatens the rice production in Vietnam. The decision to intensify cotton production in USSR caused desiccation of Aral Sea. It is interesting, that the magnitude of these effects is extremely difficult to predict. They could be large, small or have no impact at all. This is not something particular to international watersheds. In history many “inputs” created non-proportional “outputs”: the opening of a tunnel started the second intifada, the assassination of the successor to the Habsburg Throne started the First World War and many more.

The third reason is prevailing uncertainty. Institutions are susceptible to an array of uncertainties in the environmental, political, and economic arenas, threatening their long-term longevity and viability. According to James N. Rossenau: *When the uncertainty level is high the academic and policy-making communities are vulnerable to searching for panaceas.*(Alberts, 1997) Complex adaptive system theory is merely a tool for explaining

complex phenomena and does not offer a panacea of its own. It can only tell us that complex systems are ultimately comprehensible.

Complex adaptive system theory offers an inspiring conceptual and theoretical framework in which we will examine various watersheds and their institutional arrangements.

### **2.3.1 How to evaluate water institutions**

The institutional framework is a sum of all the international institutions in the watershed. International watershed is *hard wired* by the shared water source, that transmits the transboundary impacts by virtue of physical connection. The water institutions link the states in the watershed with a soft connection. They are fragile and could be dismantled, if watershed states find them useless. Therefore they have two objectives. The first objective of an institution is to be useful and address specific problems of the watershed and the second objective of an institution is to protect its own existence. Since these institutions are composed of real people, taking a real salary. This theoretical consideration is familiar to anyone ever working for an international institution.

The watershed problem could be categorized into three groups. According to post-Rio sustainability discourse, stressors can be divided into three categories. Geopolitical, socioeconomic and biophysical stressors will be identified in international watersheds.

Geopolitical stressors mostly induce water conflicts, and socioeconomic and biophysical stressors can result in ecosystem degradation, acute water scarcity, poverty and other negative impacts of insufficient or unsustainable water management. This definition has its limits since all the stressors are impacting the watershed and its institutions simultaneously and they can be dampen or exacerbated by their feedback relations.

In the case studies we will attempt to reveal the most important stresses threatening the institutional and ecosystem resilience as well as roughly estimate their impact in the examined basins. Water institutions are embedded systems in a complex and rapidly changing world. Stressors can vary in length and intensity significantly.

Institutions have been created through the process of political negotiation and use treaties consisting of rules to govern their institutional life. They are designed to have only one

steady state or equilibrium. It might be argued, that even a single institution can reorganize and find a different equilibrium; take the Interim Mekong Committee (1979-1995) as an example. After the Vietnamese invasion and installation of a pro-Vietnamese government in Cambodia, the Cambodian government was no longer independent and the Mekong Committee could no longer accept Cambodian representation. An interim Mekong Committee (IMC) was established in 1979. IMC was nothing like its predecessor, it had only three members and projects on the main stream were paralyzed (Nakayama, 2005). After long and difficult negotiations, Cambodia was readmitted in 1995.

Single institutions are mostly single equilibrium systems, but basin wide institutional frameworks can probably reorganize and find a new equilibrium through emergent behaviour.

Most of the stressor is original contribution to contemporary understanding of water institutions, but they also resonate with other scholars. According to Lipschutz *Institutions are relatively stable but not static; adaptability is critical to reproduction; change in either social or material conditions requires adaptation, but change in either social or material inputs can also provide the means for adaptation.* (Lipschutz, 2000)

### **2.3.2 Geopolitical stressors**

Geopolitical stressors can be seen as a result of longstanding interaction between space and politics. Watersheds as hydrological units are divided among states as political units in a process of fragmentation which creates transboundary watersheds. Building viable joint water institutions is a contrasting process, which creates linkages or joint mechanisms to share transboundary resources. The system of international relations is the most important source of geopolitical stressors. Stressors might include, but cannot be restricted to: significant power asymmetry, absence of diplomatic relation between riparian countries, significant dependence on transboundary water resource, generally hostile relations, no incentives for cooperation, ideological conflicts, internationalization of river basin, international integration that goes across the basins, disintegration of riparian states, major political shift including change of government, under representation in RBO, public

participations of NGO groups and dissent within the states, change of riverbed border, unresolved territory claims, etc.

### **2.3.3 Socio-economical stressors**

Watershed dynamics in demography, industrial development and local or global economic changes are among the foremost sources of socioeconomic stress. Some of them are more predictable than others. It is highly probable that post-Taliban Afghanistan will go through a phase of economic development and thus water withdrawals from Syr-Darya tributaries will increase. A similar situation also applies to Cambodia on the Mekong. Stressors from changes in the global economy are much harder to forecast and could have devastating impacts: Argentina's performance in the Paraná-La Plata institutional framework after its economic collapse should be researched. Privatization and the introduction of market mechanisms in the post-communist countries might have an impact on the on joint water management structures as they take control of the agricultural sector from state. Other examples of socioeconomic stressors could be: rapid change in population growth rate (increase/decrease), unreliable and unavailable water basin data, deterioration of an economic situation and market changes, privatization, changes in development capital policy, changes in water consumption following industrial development, expansion of irrigated land area, neglected water needs of riparians in periods of instability, increased hydropower demands, etc.

### **2.3.4 Biophysical stressor**

Biophysical stressors have a direct impact on river basin ecosystems, and an indirect impact on water institutions. Resilience is needed in both cases, but ecosystem resilience is different than institutional resilience. Ecosystems have developed through a process of evolution and can flip to another regime of behaviour. Ecosystem resilience is measured by the magnitude of perturbation that can be absorbed before the system redefines its structure by changing the variables and processes that control behaviour (Gunderson et al., 2002).

The fact that biophysical stressors affect both ecosystem and institutional resilience make them more intricate than other stressors. Their effect on institutions may be delayed as it

needs to overcome ecosystem resilience first. The Aral Sea is a good example of the delayed effect of biophysical stress, as its institutional framework seems to be resilient to geopolitical changes, but the process of environmental degradation is most likely irreversible and harm to the ecosystem permanent.

The river basin population depends on the ecosystems, and the institutional framework is responsible for the population and the ecosystem. In other words, perfect international cooperation over transboundary water that fails to protect ecosystem or population is not resilient.

The list of biophysical stressors may include: drought, flood, erosion, change of ecosystem, sedimentation, unstable amplitude of seasonal flow, biophysical changes resulting in decrease of water in watershed, unsustainable withdrawal in aquifers, salinization caused by improper water management, and deterioration of water quality due to industry/sanitation/fertilizing.

## **2.4 Aims of the thesis**

Main aim of thesis is innovative re-interpretation of known data and established ideas. The latest research development summarized in the next chapter is showing a lot of potential in study of institutional capacity of the transboundary river basins. Despite the majority of researchers using statistical analysis of quantitative data for evaluation of institutional capacity, this thesis focuses on structural and qualitative analysis of the international water institutions in the transboundary watersheds.

The institutional framework has three distinctive layers: global, regional and national. First layer consist of norms of international freshwater law. The second layer is the institutional framework of single transboundary watershed. Watershed or river basin is the main unit of analysis and institutional capacity of five selected basins will be tested. Third layer is the national institutional framework of each state. This layer is only touched upon in the Danube case study since this thesis is about transboundary watersheds and not about national water legislation.

### **2.4.1 Survey of the global international water regime**

The first aim is to examine the contemporary set of general rules of international water, in order to identify general rules governing all transboundary waters sources. The question is: what are the most important general rules governing shared water sources on the global scale.

### **2.4.2 Survey of the selected watersheds**

One of the aims of this work is to test the institutional capacity of five particular watersheds in to answer questions about their capacity to transform conflicts into cooperation and their capacity to address biophysical, socioeconomic and geopolitical changes. These changes will be called stressors, based on previous research. (Landovsky, 2006) Theoretical hypothesis is that network of institutional arrangements emerge, evolve and adapt under influence of biophysical, socioeconomic and geopolitical stressors.

The first purpose of such institutional framework is to maintain equilibrium between the competing interests of states (and non-state actors).

The second purpose of the institutional framework is to buffer socioeconomic, biophysical and geopolitical changes (stressors) in the watershed and preserve its own existence under the changing conditions.

The third purpose of institutional framework is to protect its own institutional existence

The practical outcome of this dissertation is the gap identification in both institutional framework's spatial scope and institutional coverage of the relevant stressors. Stressor would be intuitionally covered, when the treaty contains a mechanism or provision to address the stressor in question.

Given these complexities and context dependencies, of the examined problems of aquatic systems themselves, attention to the issue of water and conflict is best assess by approaches that respect interconnections and linkages between diverse actors and processes. *In essence this is an appeal for geographic and historical approaches examining complex linkages between conflicts and water-related issues in ecological, biophysical, and socio-political senses. Such approaches would move away from linear analyses with unique*

*focus on state scales and actors that attempt to define singular outcomes associated with particular water conditions and uses. (Flint, 2004)*

## Part II Theory

### 3 Evolution of International Water Law

The system of source of the public international law lacks the hierarchical structure of domestic legal systems. Modern international law appears after the naissance of modern system of international relations in the aftermath of thirty years war<sup>7</sup>. Many rules mentioned in this thesis are older than system of international relations, but it would be methodologically incorrect to label them as norms of international law. It could be said that the whole system is evolving from the times, when the first streams crossed the first borders of the city states in Mesopotamia described in section 8.2.1 This chapter concentrate o the questions of adaptation in the modern international law system, with a special regard to salient role of international custom. The hierarchy of sources and analysis of the principal trends in the custom dataset of 74 treaties is also integrated. The survey of the dataset is the only usage of quantitative methods in this thesis, which a critical response to overuse of quantitative methods on the field of water conflict and cooperation studies. The quantification is used only for summarizing the result of a careful structural analysis of the treaty texts.

#### 3.1 Sources of international water law

The norms of international water law are building blocks of the general, global regime governing international freshwater resources. These norms can be divided according to number of subjects they bind, consensuality, origin, or normative content. These definitions are part of a legal science or jurisprudence. The only definition of applicable international law is in *Article 38 of the Statute of the International Court of Justice*<sup>8</sup>:

Article 38

1. The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply:

---

<sup>7</sup> Symbolic moment is usually signature of series of peace treaty in Westphalia in October 1648.

<sup>8</sup> *Statute of the International Court of Justice* (1949) [online] International Court of Justice in Hague. 2011-08- [accessed 30 July 2011],. available at URL:<<http://www.icj-cij.org/documents/>>

- a. international conventions, whether general or particular, establishing rules expressly recognized by the contesting states;
  - b. international custom, as evidence of a general practice accepted as law;
  - c. the general principles of law recognized by civilized nations;
  - d. subject to the provisions of Article 59, judicial decisions and the teachings of the most highly qualified publicists of the various nations, as subsidiary means for the determination of rules of law.
2. This provision shall not prejudice the power of the Court to decide a case *ex aequo et bono*, if the parties agree thereto.

The term *international conventions* under *letter a)* include all the binding documents accepted by states or international organizations as a law. In this thesis the term *treaty* is used instead of *convention*, because the majority of specific literature prefers term international water treaty (IWT). A treaty could be titled as memorandum, agreement, minutes, exchange of notes or letters, but it does not affect its applicability.<sup>9</sup> Treaties are the firsthand accounts of institutional frameworks under the examination. A treaty is a mandatory step even if a river basin organization is set up and therefore every important change of institutional framework leave trace in the treaty collection held by the United Nations Secretariat.

The water treaties can be bilateral like the *Treaty between the government of the Republic of India and the government of the People's Republic of Bangladesh on sharing of the*

---

<sup>9</sup> Examples of the titles of international water treaties: *Treaty between the United States of America and Mexico relating to the waters of the Colorado and Tijuana Rivers, and of the Rio Grande (1944)*, *Exchange of notes constituting an agreement concerning the loan of waters of the Colorado River for irrigation of lands in the Mexicali Valley (1966)*, *Agreement of cooperation between the United States of America and the United Mexican States regarding pollution of the environment along the inland international boundary by discharges of hazardous substances (1985)*, *Agreement between the United States of America and the United Mexican States on cooperation for the protection and improvement of the environment in the border area (1983)*, *Mexico-US agreement on the permanent and definitive solution to the salinity of the Colorado River Basin (1973)*

*Ganga/Ganges waters at Farakka*<sup>10</sup> or multilateral like the 1997 *Convention on the Law of the Non-navigational Uses of International Watercourses*.<sup>11</sup>

Water treaties could be also evaluated according to the normative content. If a treaty specifically describes the rights and obligation of signatories it has a high normative content, and is considered *hard law*. On the contrary, if the treaty uses very vague, ambiguous and unspecific language and the rules derived from the treaty are not requiring states to do or omit specific acts, the treaty is considered *soft law* according to its normative content. All the international laws regarding treaties are in one *hard law* norm called 1969 *Vienna Convention on the Law of the Treaties*.<sup>12</sup> On the other hand action plan *Agenda 21*<sup>13</sup> adopted by the *United Nations Conference on Environment and Development* (UNCED) held in Rio de Janeiro, Brazil, 3 to 14 June 1992, is an example of a salient but *soft law* treaty instrument with relatively low normative content. The last but most complicated division according to the consensual or non-consensual character of the norm is explained in the next chapter.

### **3.2 Emergence of an customary water law**

Some norms are being recognised by international law even though they are not written, nor easily defined nor frequently used by the International courts. These norms are so called customary norms of international law.

Authoritative writings of international legal jurisprudence deal with the emergence of customary law in the general international law with sophisticated but imprecise definition. Imprecise definitions may seem like a *contradiction in adjecto*, but the contemporary system of international jurisprudence does not have a better answer yet. The prominent

---

<sup>10</sup> *Treaty between the government of the Republic of India and the government of the People's Republic of Bangladesh on sharing of the Ganga/Ganges waters at Farakka* [online] Transboundary Freshwater Dispute Database. 2011-07-[accessed 30 July 2011], available at URL:<<http://ocid.nacse.org/tfdd/>>

<sup>11</sup> *Convention on the Law of the Non-navigational Uses of International Watercourses*. [online] United Nations Treaty Collection 2011-07-[accessed 30 July 2011], available at URL: [http://untreaty.un.org/ilc/texts/instruments/english/conventions/8\\_3\\_1997.pdf](http://untreaty.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf)

<sup>12</sup> *Vienna Convention on the Law of the Treaties*. [online] United Nations Treaty Collection 2011-07-[accessed 30 July 2011], available at URL: [untreaty.un.org/ilc/texts/instruments/english/conventions/1\\_1\\_1969.pdf](http://untreaty.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf)

<sup>13</sup> United Nations Division for Sustainable Development – Department of Economic and Social Affairs

international lawyer and theoretician Anthony D'Amato claims the term *customary* norm misleading. He would suggest labelling all the customary rules of international law as general rules of international law and puts forward several arguments to support this idea. According to D'Amato treaty law is consensual law and it is written, specific and applies only to the parties of the agreement. On the other hand customary law is non-consensual, unwritten, and general and applies *erga omnes*. (D'Amato, 2009) Only minor correction is needed in this eloquent categorization. Not all customary laws are general, there are also local customs, valid only regionally.

Customary law came into use already in the 19<sup>th</sup> century jurisprudence, when Pitt Cobbet, one of the professors of international law who was determined to explain the matter of customs to his students, developed a metaphor that become popular description of customary law:

At first each wayfarer pursues his own course; gradually, by reason either of its directness or on some other ground of apparent utility, some particular route is followed by the majority; this route next assumes the character of a track, discernible but not as yet well defined, from which deviation, however, now becomes more rare ; whilst in its final stage the route assumes the shape of a well-defined path, habitually followed by all who pass that way. And yet it would be difficult to point out at what precise moment this route acquired the character of an acknowledged path. The growth of usage and formation of custom, both as between a community of individuals and the community of nations, proceeds much on the same lines. (Cobbet, 1909)

This is a colourful metaphor. Cobbet only forgot to add that some heavier states are making exceptionally deep footprints. An unresolved question is who or what will determine the statute of an emerging rule before it assumes the shape of a well defined path. Eminent scholars in the international law or international water law like Shaw or Dellapenna give a similar but equally unsatisfying answer. Customary international law consists of the practices of states undertaken out of a sense of legal obligation, that is out of a sense that the practice is required by law (*opinio juris sive necessitates*) or simply *opinio juris*. (Dellapenna, 2001b; D'Amato, 1987; Shaw, 2008) This Latinism is even worse than the problem it tries to cure. When states act under a belief that their actions are required by international law, then they are said to be acting with *opinio juris* (D'Amato, 2009). But states do not have believes and no one have ever confirmed that a person with *full powers*

to officially represent state believed he is doing something out of a legal obligation. This may result from the origin of *opinion juris*. It was developed by writer *Francois Gény* as an attempt to differentiate legal custom from mere social usage (Shaw, 2008) under the French domestic law and not in the communities of independent states.

D'Amato comes hypothesize that the international legal system (ILS) is a system as described according to Bertalanffy's General System Theory (Hammond, 2003). Ludwig von Bertalanffy defined a system as a *complex of mutually interacting components*. The legal system in his view is designed to give a definitive answer to one and only perpetual question. Is the conduct of state legal or illegal according to ILS set of rules?

This yes/no question is processed not only through internal system memory of ILS. The internal memory of ILS is filled with rules emerging from the interplay between sovereign actors because there is no authority above the sovereign states. These rules are not necessary conflict reducing, but the ILS that processes them is in fact biased towards cooperation. Why? Because international law is admitted as an independent actor, than it will also mind its own interest which are connected with the survival and relevancy of the ILS. In a chaotic and uncertain world, the ILS does not thrive. An orderly and egalitarian community of states is ideal for ILS. D'Amato calls the system autopoetic (D'Amato, 2005), influenced by the work of the biologists Varela and Maturana (Maturana & Varela, 1980). Autopoiesis is the process by which a system produces its own organization and then maintains itself in the space in which its components exist. Author of this thesis prefers the term self-organising, which is more established in the general systems theory and theory of complex adaptive systems (Mitchell, 2009).

If the ILS is a self-organizing entity responsible for interpreting the rules, which is allowed in the article 38 of the *Statute of International Court of Justice*<sup>14</sup>, then the system will be biased in favour of cooperation and peaceful conflict resolution. If two states are disputing, the ILS will be keen to enter the dispute as an agent acting on behalf of all non-represented states and promote peaceful solution. A violent conflict is detrimental for the system of

---

<sup>14</sup> *Statute of the International Court of Justice* (1949) [online] International Court of Justice in Hague. 2011-08- [accessed 30 July 2011],. available at URL:<<http://www.icj-cij.org/documents/>>

international relations and thus detrimental for the ILS. English has a word for such intrusion into the quarrel by uninterested party and the word is busybody. According to D'Amato, the ILS is a busybody saving its own relevance and existence by promoting rules like *pacta sunt servanda* or peremptory norms preventing states from aggressive war<sup>15</sup>. The ILS cannot enter just any dispute – it must be explicitly invited by the states. The vast majority of conflicts are settled out of the court in the domestic or the international law system. But the ILS does not deal with all conflicts and illegal acts. The illegality must be claimed by another state or international organization. The inputs to the system of international law appear in pairs act and omission claim and counterclaim (D'Amato, 2009). If there is no claimant, the system remains dormant and does not react to the obvious trespass of its rules from the outside environment. If the Czech Republic had invaded the newly established state of Slovakia on the 31.12 1992 and there would not had been a single voice in the whole world to claim it was illegal aggression nothing would have happened. If there is no claimant, there is no action from the ILS (D'Amato, 2009). The invasions to the state territory unapproved by the UN Security council resolution still happen and not all of them are labelled as breach of international law.

In the Preamble of the 1969 *Vienna Convention on the Law of the Treaties*<sup>16</sup> is reaffirmed that customary law *will continue to govern questions not regulated by the provisions of the present Convention*. It is a common mistake, since this reaffirmation was utterly unnecessary. The customary rules and treaty rules are the outcomes of two different processes, and they are both valid sources of international law existing side by side. Principles like *ius posterior derogate priori* cannot be used as the International court of

---

<sup>15</sup> Art. 1,2,33,39 of *The United Nations Charter*. [online] United Nations Treaty Collection 2011-07-[accessed 30 July 2011], available at URL: <http://www.un.org/en/documents/charter/>

<sup>16</sup> *Vienna Convention on the Law of the Treaties*. [online] United Nations Treaty Collection 2011-07-[accessed 30 July 2011], available at URL: [untreaty.un.org/ilc/texts/instruments/english/conventions/1\\_1\\_1969.pdf](http://untreaty.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf)

Justice ruled in the Case Concerning Military and Paramilitary Activities in and against Nicaragua (Nicaragua against the United States of America 1986).<sup>17</sup>

### 3.3 Coercion in International law

If the legality of an act of in question state proved by the ILS, then the system should not take any further actions. But what happens when the state's action is a pronounced breach of international law? The same database serves as the enforcement function of international law. The states have obligations under international law and also rights under international law. If an act of state is labelled as illegal by the ILS, the other states receive a new right to punish the perpetrator. This right is a reprisal in which other states deny the trespasser its rights under international law. The reprisal has several stages, and the international system knows means legal according to the ILS to restore the *stat que ante*. The Iraqi invasion to Kuwait and the resolutions no.: 660, 661, 662, 664, 665, 666, 667, 669, 670, 674, 677, 678 (all 1990) and 686 (1991) are useful examples of different stages of coercion in the international law system.

It is a common believe purported for example by Hathaway (Hathaway, 2004) that international law has a very limited powers. This may be enhanced by theory of *exceptionalism* , which is popular in the neoconservative circles in the USA. In this word disobedience to international law does not pay, but so do some states go unpunished for waging a war, without consent of the UN Security Council. Sometimes these states even wage war not only against an existing state, but also against an abstract noun.<sup>18</sup> The reprisal in domestic systems are entrusted to judicial branch and protected by political power. The reprisals in international system are entrusted to the peer states and pronounced legal by the ILS. The international law is always political and the domestic law should never be political.

---

<sup>17</sup> Case Concerning Military and Paramilitary Activities in and against Nicaragua (Nicaragua against the United States of America) [online] International Court of Justice in Hague. 2011-08-[accessed 30 July 2011],. available at URL:<<http://www.icj-cij.org/>

<sup>18</sup> Who ever read this far send the correct name of an author of this quote to [jlandovsky@gmail.com](mailto:jlandovsky@gmail.com) and win a coffee.

### **3.4 Evolution of doctrines and principles of international water law**

#### **3.4.1 Harmon Doctrine (Absolute Territorial Sovereignty)**

The Harmon Doctrine is named after the general of the USA Judson Harmon. He pursued this doctrine as an official position of his government in a dispute on Rio-Grande River between Mexico and SA in 1895. (Dellapenna, 2001b) According to the Harmon Doctrine, every state has the absolute right to use all transboundary waters on its territory regardless quantity or quality of the water flowing to the territory of neighbouring states. This doctrine does not allow much space for negotiation or compromise. *Years later the US State Department concluded that the USA had never considered the Harmon Doctrine to be anything more than special pleading and decisively repudiated the Doctrine* (Dellapenna, 2001b).

Some variation on *Harmon Doctrine* was invoked India on Indus (1948) and by Ethiopia on Nile (1959).

The Harmon Doctrine is incompatible of *sic utere tuo ut alienum non laedas*, which is considered a general principle of law recognized by civilized nations according to the art. 38 para. 1, c) of the Statute of the *Statute of the International Court of Justice*<sup>19</sup>. Cohen states that state practice has also repudiated the doctrine. In the 1950s, the United States finally rejected the doctrine during its dispute with Canada over the Columbia River (Cohen, 1991).

#### **3.4.2 Absolute Riverine Integrity**

Another extreme doctrine is giving a downstream user right for the natural flow of water at the border between riparian countries. It is a reversed Harmon doctrine, and it gained even less popularity among the states than absolute territorial sovereignty. It never became even close to become a *custom of international law*.

---

<sup>19</sup> Statute of the International Court of Justice (1949) [online] International Court of Justice in Hague. 2011-08- [accessed 30 July 2011],. available at URL:<<http://www.icj-cij.org/documents/>>

### 3.4.3 Prior appropriation

Doctrine simplified as first in time first in right is used in transboundary water law within the territory of the United States of America. It was used to settle water disputes within the US federation and therefore the term transboundary is used instead of international. It is not likely to become a customary rule of international law, but its validity for transboundary water disputes in the USA is undisputed. Egypt would be a vocal supporter of historical uses on the international arena, but again *usus longaevus* is missing.

### 3.4.4 Doctrine of Limited Territorial Sovereignty and Limited Integrity of the River

Even though this looks like two contradicting doctrines it is in fact one doctrine consisting of two complementary parts making a perfectly ambivalent whole. It will be proved that ambiguity is a prevalent method of describing current practice of states by the system of international law. The arbitration between France and Spain recalled the *sovereignty in its own territory of a State desirous of carrying out hydro-electric developments*<sup>20</sup> but acknowledged *the correlative duty not to injure the interests of a neighboring State* (Cohen, 1991).

This rule got a strong recognition in both teachings of the most highly qualified publicists of the various nations (Dellapenna, 2001b; Haftendorn, 2000; McCaffrey, 1999; Shaw, 2008) and in the codifications of international water law regardless of their ratification status. Among the most prominent are the so called Helsinki Rules and the 1997 *Convention on Non-navigational uses of international watercourses*. These have only supporting and evidential role in determining whether a rule is a custom of the international law or not. International customs are binding between all states with one important but overlooked exception. This exception is a persistent objector doctrine.

### 3.4.5 Persistent objector doctrine

The doctrine of the persistent objector limits the enforceability of international laws. According to the doctrine, if a state persistently objects to the development of a customary

---

<sup>20</sup> 1923 Geneva Convention on the Development of Hydraulic Power Affecting More than One State

international law, it cannot be bound by the rule it objects. It is like emergence of customary international law in reverse. The doctrine of persistent objector does not lead to a rule but to an exception.

A general example from the practice of states follows: Upstream riparian invoke unlimited territorial sovereignty. India claimed absolute sovereignty in the early phases of negotiations over the 1960 Indus Water Treaty, as did France in the Lac Lanoux case, and Palestine over the West Bank aquifer. Downstream riparians often could make a counter claim revoking some variation on absolute river integrity or historic use. Spain insisted on absolute sovereignty regarding the Lac Lanoux project, whereas Egypt claimed historic rights against first Sudan, and later Ethiopia, on the Nile (Wolf, 2007).

If these states continued rigorously with this practise, acted with peculiar *opinion juris* and never take obligation that would limit their water sovereignty, than these states would find themselves outside of customary laws of limited sovereignty explained recently. In this thesis several treaties will challenge the common wisdom about some states being persistent objectors by finding evidence of adherence to customary rule declared in some of the treaty documents.

#### **3.4.6 Rivers as borders between states**

If there is one section in international water law where the rules of the international law are clear and rigid, it is certainly the delimitation of borders on rivers. It was briefly mentioned as early as in 1625 by forefather of international law Hugo Grotius in *De Jure Belli ac Pacis Libris Tres* (Grotius, 1625).

Rivers form suitable natural borders and watershed borders defined by the highest ridges of the water divide are also fitting natural borders. The only complicated part of border delimitation on rivers is the river bed dynamics and dual regimes for navigable and non-navigable rivers.

The rivers constituting a border between states are mostly navigable. Borders on the international navigable rivers lead through the centre of the navigable part of the stream. This median line is in equidistance from the line connecting points on the surface of the water level with sufficient depth for navigation of the ships. This means that the border

could move with the moving of the navigable part. The middle or median line is called *thalweg* in some the scholarly articles.(Caponera, 1992)

The middle line is measured from the line of the river bank if the river is not navigable. This delimitation goes back to the Roman law in which the riparian proprietors of the land on the riverbanks were entitled *usque ad filum aquae*. They had a right for the ownership of the riverbed to the middle of the boundary river.

Rivers are dynamic structures and they substantially change over time. Their dynamics is addressed by international water law. The general rule regarding river dynamics is that the border moves with the river. An exemption from the above mentioned rule is the situation when rivers rapidly abandon the riverbed and form a new one. In this case the border remains in the old riverbed.

*Alluvio* is an ancient rule allowing an enlargement of a state territory by the river siltation deposits on the river banks. The only condition which must be fulfilled is the gradual slow nature of the process. It must happen so gradually that it escapes observation. This could be useful in determining borders in the deltas of large rivers and the Indo-Bangladeshi border is the first to come on mind.

*Accesio* covers the situation when a land on the bank is torn by the river from one riparian and brought to a different one. After it is firmly attached to the new land it becomes sovereign territory of the different state than it was before.

The water sources on lakes are defined by the specific and recognized United Nations *Convention on the Law of the Sea (UNCLOS)*.

### **3.5 Milestones in the Codification of international water law**

Two important institutions have dedicated themselves to study and advance the international law. The first is The International Law Association (ILA) which is a nongovernmental organization founded in Brussels in 1873. Its task is the study,

clarification and development of the international law.<sup>21</sup> It has a committee for water law which has contributed to the creation of the so called Helsinki Rules in 1966 and their revision in 2004 called Berlin Rules.

The other important organization codifying international law of freshwater sources is the International Law Commission (ILC). Goals of the ILC resemble goals of its older predecessor (ILA) and they include codification of customary water law and drafting of the international water law conventions for the General Assembly of the United Nations. The ILC is an international organization within the United Nations and it was founded by the article 13 para. 1 a) of The UN Charter<sup>22</sup>.

### 3.5.1 Helsinki Rules

The first modern codification of the water related customary rules has its flaws, but it encompasses the long history of competing or even contradictory rules regarding shared water sources. The historical water rules of Mesopotamia, India and of the Islamic law are described in detail in the case studies. Helsinki rules are the first truly transboundary codification and thus legal definition of the transboundary or international water sources respecting physical unity of the water cycle in the international drainage basin had to be provided. It was defined in *Article 2*:

An international drainage basin is a geographical area extending over two or more States determined by the watershed limits of the system of waters, including surface and underground waters, flowing into a common terminus.<sup>23</sup>

Helsinki rules abandoned the right for the water *per se* and towards the right for beneficial use of water. It states in *Article IV* that:

---

<sup>21</sup> Statute of the International Law Association (ILA) [online] International Law Association 2011-07 [accessed 8 August 2011] available at [URL:http://www.ila-hq.org/en/about\\_us/](http://www.ila-hq.org/en/about_us/)

<sup>22</sup>The Charter of the United Nations [online] United Nations [accessed 8 August 2011] available at: <http://www.un.org/en/documents/charter/index.shtml>

<sup>23</sup> The Helsinki Rules on the Uses of the Waters of International Rivers [online] 2010-04 [accessed 02 August 2011] [online] The International Water Law Project 2011-07-[accessed 30 July 2011],. available at URL: [http://internationalwaterlaw.org/documents/intldocs/helsinki\\_rules.html](http://internationalwaterlaw.org/documents/intldocs/helsinki_rules.html)

Each Basin State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin.

Unfortunately there was as much as 11 relevant factors, and their hierarchy or method for evaluation was not very useful.<sup>24</sup> The Helsinki Rules, adopted in 1966, were the cornerstone of all subsequent codifications of customary international law. Even though it is merely a secondary source of law. According to Article 38 and Article 59 of the Statute of the ICJ, it would be under category of *the teachings of the most highly qualified publicists of the various nations, as subsidiary means for the determination of rules of law*. The applicability of each customary norm in any of the aforementioned codifications must be examined regarding *opinion juris* and evidence of the practice of states - *usus longaevus*. The Helsinki Rules were only mentioned once in the international treaty, namely in the Mekong River Committee (Wolf, 1999). The work of international Law Association (ILA) continued and Helsinki Rules were updated firstly in 2000 in Campione, Italy, and then they were completely revised in Berlin in 2004 (S. M. A. Salman, 2007).

### 3.5.2 Berlin Rules

The Berlin Rules from 2004 are the major Helsinki Rules revision elaborated by the ILA. This version is taking into account relevant changes from the period 1966-2004 including the judgment of the ICJ in case of Gabčíkovo Nagymaros (Hungary vs. Slovakia) and the Convention on Non-navigational uses of International Watercourses. The adoption of the Berlin Rules was contentious and the members of the ILA Water Resource Committee did not vote equivocally. Some members asked the committee to include their dissenting opinions (*votum separatum*). Those members required that many articles<sup>25</sup> should

---

<sup>24</sup> *The weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what is reasonable and equitable share, all relevant factors are to be considered together and a conclusion reached on the basis of the whole.* in: The Helsinki Rules on the Uses of the Waters of International Rivers [online] 2010-04 [accessed 02 August 2011] [online] The Helsinki Rules on the Uses of the Waters of International Rivers 2011-07-[accessed 30 July 2011],. available at URL: <http://www.internationalwaterlaw.org/bibliography/articles/general/Salman-BerlinRules.pdf>

<sup>25</sup> *Article: 4 - 7, 9, 18, 20, 23 Berlin Rules (2004)* [online] International Water Law Project 2004-08-[accessed 30 July 2011] available at URL: [http://www.internationalwaterlaw.org/documents/intldocs/ILA\\_Berlin\\_Rules-2004.pdf](http://www.internationalwaterlaw.org/documents/intldocs/ILA_Berlin_Rules-2004.pdf)

comment with normative “shall” instead of recommendatory “should”. The process is described in the Water Committee Report.<sup>26</sup>

### **3.5.3 1997 Convention on the Law of Non-Navigational Uses of International Watercourses**

The International Law commission (ILC) was requested by the General Assembly of the United Nations to codify all customary law and proposed a draft convention to be adopted by the member states. After more than 20 years *Convention on the Law of Non-Navigational Uses of International Watercourses*<sup>27</sup> (1997 Convention) was finished and on a 21<sup>st</sup> May 1997 it was adopted by the general assembly. It is of extraordinary importance that some states voted against the adoption of the text. 103 states including Bangladesh, Hungary, Slovakia, Syria and USA voted for the adoption, 27 states including India, Egypt and Ethiopia abstained and three states (China, India, Burundi) voted against the adoption of the *1997 Convention*. It is of extraordinary importance for this thesis that two out of three that were against the convention are upstream riparian countries in more than half of our case studies. China and Turkey are consistently revoking the principles of international water source law in order to attain a persistent objector status. This important issue will be later discussed in detail.

The most controversial article discussed by scholars is Article 7 requiring states not to cause significant harm to other users of the shared resources. The development of upstream riparians will inevitably collide with the already established uses of the downstream users, as many have pointed out. (Dellapenna, 2001b; McCaffrey, 1999)

The convention shall enter into force on the 90<sup>th</sup> day following the date of deposit of the 35<sup>th</sup> instrument of ratification, acceptance, approval or accession with the Secretary-

---

<sup>26</sup> *ILA Berlin Conference 2004 - Water Resources Committee Report - Dissenting Opinion* [online] International Water Law Project 2004-08-[accessed 30 July 2011] available at URL: [http://www.internationalwaterlaw.org/documents/intldocs/ila\\_berlin\\_rules\\_dissent.html](http://www.internationalwaterlaw.org/documents/intldocs/ila_berlin_rules_dissent.html)

<sup>27</sup> *Convention on the Law of the Non-navigational Uses of International Watercourses*. [online] United Nations Treaty Collection 2011-07-[accessed 30 July 2011], available at URL: [http://untreaty.un.org/ilc/texts/instruments/english/conventions/8\\_3\\_1997.pdf](http://untreaty.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf)

General of the United Nations. To this day only 24 countries have ratified the *1997 Convention*.

### **3.6 Contemporary principles of international water law**

The hypothesis requires to identify applicable general water law in order to investigate the historic uses of these principles. The preceding theoretical chapter set the ground for the upcoming analysis. It has been proved that customary laws of international law are hard to find and need to be declared either by an international tribunal or by an applicable treaty. In order to find out what are the current trends in customary international water law a sufficiently large dataset of recent treaties has to be examined. The available database of Oregon State University (TFDD), Food and Agriculture Organization (FAOLEX) are gathering 74 applicable agreements that have been manually recoded for provisions recalling four general principles of international law mentioned in the Judgement of the ICJ regarding Gabčíkovo-Nagymaros dispute. These principles are: The principle of equitable and reasonable utilization; the principle of sustainable water use; “no significant harm” rule; and the principle of prior notification.

#### **3.6.1 The Principle of Equitable and Reasonable Utilization**

The Principle of Equitable and Reasonable Utilization and Participation was originally formulated by *Article 4* of the 1966 Helsinki Rules as an entitlement to *an equitable and reasonable share of the beneficial uses of the waters of an international drainage basin*. The principle was considered to be a central rule of international water law (McCaffrey, 1999). Equitable utilization was mentioned in two decisions of the Permanent Court of International Justice (River Oder Case 1929, River Meuse Case 1937). This principle was one of the most contentious during the negotiations of the *1997 Convention on Non-navigational Uses of International Watercourses* and therefore it was reformulated as an obligation to use international watercourse in a reasonable and equitable manner. Vice versa it is a right to a reasonable and equitable share of the uses and benefits. Later on the International Court of Justice (ICJ) confirmed the fact that reasonable and equitable use became a custom of international law. Nevertheless this rule must be seen according to its relation to the No Harm rule.

**Table 1: Use of the Principle of Equitable and Reasonable Utilization in international water treaties 1980-2003**

Treaties signed between	1980-1987	1988-1995	1996-2003
Sustainability reference/Total	5/21	12/34	9/19
Prevalence in percent	24%	35%	47%

### 3.6.2 The Principle of Sustainable Water Use

The concept of sustainability is not easy to define. One influential attempt to define sustainable development was proposed by the United Nations World Commission on Environment and Development. According to the final document known as the Bruntland Report<sup>28</sup> *sustainable development is a pattern of resources use that aims to meet human needs, while preserving the environment so that these needs can be met not only in the present, but also for generations to come.*

The use of water is *usufructory* by its nature. Water cycle renders the destruction of water by usage impossible. In legal theory an absolute ownership of water is also impossible, in a perfect sense, because one of three components of ownership cannot be employed<sup>29</sup>: Unsustainable use of water appears in two contexts in the water literature. Firstly unsustainable water use is irreversibly affecting the environment or secondly the water use is unsustainable in case of pumping water from fossil or decoupled aquifers. These aquifers common in arid regions are disconnected from the water cycle, and once the water is pumped the water source is depleted. According to statistical research on the TFDD, the principle of sustainable water use was definitely strengthened and deepened in the last years. But it is The prevalence of direct reference to the sustainable water use in all water treaties is for the years 1980-2003:

---

<sup>28</sup> Our Common Future, Report of the World Commission on Environment and Development, World Commission on Environment and Development, 1987. Published as Annex to General Assembly document A/42/427, Development and International Co-operation: Environment August 2, 1987. [online] 200-11- [accessed 04 August 2011] available on-line: <http://www.un-documents.net/wced-ocf.htm>

<sup>29</sup> Ownership consist of *usus* - right to use resource, *fructus* – right to use the “fruits” of resource and *abusus* - right to fully consume or destroy resource

**Table 2: Use of the principle of Sustainable water use in international water treaties 1980-2003**

<b>Treaties signed between</b>	<b>1980-1987</b>	<b>1988-1995</b>	<b>1996-2003</b>
<b>Sustainability reference/Total</b>	1/21	10/34	11/19
<b>Prevalence in percent</b>	5%	30%	58%

### **3.6.3 “No significant harm” rule**

The “No significant harm” rule was another of the two most controversial articles of the 1997 *Convention on Non-navigational Uses of International Watercourses*. This was probably the reason for making it more flexible by adding a due diligence clause. This clause is formulated as obligation *to take all appropriate measures*. The whole controversy lies in the relationship between *no significant harm* in *Article 7* and *reasonable and equitable use* in *Article 5*. The exclusive use of *Article 7* will give preferential treatment to existing uses of downstream states, because they will protect their existing uses on the virtue of no significant harm. The development plans of upstream states will be justified by *Article 5* on the basis of *reasonable and equitable utilization* (McCaffrey, 1999). This scenario is likely to occur as the headwaters of many of upstream states of international rivers are developing their hydropower potential and thus inflict harm to downstream states agricultural uses, which can be there for millennia. A downstream state will block the upstream development by invoking *Article 7* to defend existing uses. An upstream state will demand reasonable and equitable utilization making the circle complete.

The use of reference to *no significant harm* along the reference to *reasonable and equitable utilization* may render the treaty ambiguous. This might help the political processes to justify the adoption of the treaty on the home front, but could be destructive in the future.

**Table 3: Use of the principle of No significant harm rule in international water treaties 1980-2003**

<b>Treaties signed between</b>	<b>1980-1987</b>	<b>1988-1995</b>	<b>1996-2003</b>
<b>Sustainability reference/Total</b>	0/21	5/34	8/19
<b>Prevalence in percent</b>	0%	15%	42%

### 3.6.4 The principle of prior notification

Soft law can overcome deadlocks in the relations of states that result from economic or political differences among them, when efforts at firmer solutions have been unavailing. The distinction between soft and hard norms under international law is a difficult and challenging task, given the nature of law making process is both informal and essentially decentralized. Despite all these criticism, soft law does perform certain positive functions in a world that is deeply divided.

The Principle of prior notification must be considered as a precondition to the smooth function of No-harm principle and Equitable and Reasonable Utilization in Participation. The obligation to give the prior notification binds the state which plans to implement a measure with potential significant adverse effect on other water course states. It is an example of unambiguous rule which is enough flexible to work in majority of transboundary watersheds. It was agreed upon by most of the delegations, while negotiating the 1997 Convention (McCaffrey, 1999). The reason behind relatively smooth acceptance of this rule might be in its auxiliary nature. This principle does not constitute a veto power for the co-riparians and may result only in temporary suspension on the implemented projects. This rule would be easily implemented into auxiliary provisions of any treaty, but does not have the power to solve the most contentious issues.

**Table 4: Use of the principle of Prior notification in international water treaties 1980-2003**

Treaties signed between	1980-1987	1988-1995	1996-2003
Sustainability reference/Total	3/21	6/34	7/19
Prevalence in percent	14%	18%	37%

### 3.7 Discussion on the law of International water sources

System of international water law is adapting to international relations. This adaptation is allowing the international legal framework to preserve its own *raison d'être* and usefulness, but for a cost. The cost is in lower specificity and ambiguity in both general rules and treaty provisions. Sometimes the opposing principles are emerging side by side in the practice of states, but it could be assert that rules of customary international water law based on limited territorial sovereignty, have prevailed in the dataset. These findings even though confirmed for the first time is by the treaty survey are being supported by the scholarly articles. (Dellapenna, 2004; McCaffrey, 2003a, 2004)

McCaffrey recently pointed out that the rules of customary international water law are sufficiently flexible to permit adaptation to changed circumstances if properly understood. The water treaties are in principle rigid instruments, but they are often modified to bring flexibility and they reference the principles of territorial sovereignty to increase flexibility even more. The rules of customary international water create ambiguous guidelines especially in conjunction with each other. For example, the application of *Article 5* (reasonable and equitable use) and *article 7* (no-harm rule) of *1997 Convention* is ambiguous, because of obligation not to cause significant harm which protects the historic water rights of downstream users collides with a right to reasonable and equitable use of international water resource of other riparians.

The system of source of the public international law lacks the hierarchical structure of domestic legal systems. The adaptation water rules in of the international law system, with a special regard to salient role of international custom was described in the thesis. According to the historic analysis the principles of absolute territorial integrity are being abandoned in favour of principles of limited territorial sovereignty. Shift from Harmon doctrine to reasonable and equitable use is vital example. Changes in general rules of international waterlaw were first recognised on milestones of codification process including 1966 Helsinky rules, 2004 Berlin rules and still not ratified 1997 *Convention on the Law of Non-Navigational Uses of International Watercourses*. Then the actual international treaties were examined for references to presumed principles of international

water law. The dataset of 74 international water treaties confirmed, that following principles are gaining acceptance as customary rules of international:

1. Principle of equitable and reasonable utilization
2. “No significant harm” rule
3. Principle of prior notification
4. Principle

The number provisions directly invoking these principles has risen greatly in the last years.

# Part III Case studies

## 4 The Danube River

The Danube River is shared by the most riparian nations. It is the watershed with the most river basin treaties and the most elaborate network of relations between nations, blocs of nations and international organisations. With the total length of 2,780 km and a drainage area of 817,000 km<sup>2</sup> the Danube is an important link connecting Western and Eastern Europe. There are 19 countries in its basin and 81 million inhabitants. The Danube flows from the Black Forest in Germany, passes eastwards through Austria, Slovakia and Hungary and also creates a natural state border between the last two. The river then turns south through Hungary and Croatia and eastwards into Serbia. Past Belgrade, the Danube flows between Serbia and Romania, and then Bulgaria and Romania. Finally, the river turns northward back into the Romania and, just short of its delta by the Black Sea, runs between Romania and Ukraine. The Danube river water is a source for agriculture, domestic and industrial use and the river is a major European transportation route. The Rhine-Main-Danube Canal<sup>30</sup> connects the Black Sea with the Atlantic Ocean, but its merit has been contested due to *a large number of dikes, navigation locks and other hydraulic structures to aid navigation* (Linnerooth-Bayer & Murcott, 1996). The river also has significant hydroelectric potential. There are over 40 hydropower stations on the upper Danube, which are matched in energy output by the two enormous Iron Gate stations between Serbia-Montenegro and Romania (Linnerooth-Bayer & Murcott, 1996). The Danube River basin and its tributaries make up an aquatic ecosystem of high socio-economic and biophysical value. The climate is diverse, influenced by the Atlantic in the west and the Mediterranean in the east. It remains continental in the middle parts of Europe.

---

<sup>30</sup> Since 1992, the Rhine has been linked with the Danube to form the 3,500 km Rhine-Main-Danube Waterway connecting the North Sea and the Black Sea (Nielsen, 2008)

Table 5: Country areas of the Danube Basin<sup>31</sup>

Country	Coverage in DRB (km <sup>2</sup> )	Percentage of DRB (%)
Albania	126	< 0.1
Austria	80,423	10.0
Bosnia and Herzegovina	36,636	4.6
Bulgaria	47,413	5.9
Croatia	34,965	4.4
Czech Republic	21,688	2.9
Germany	56,184	7.0
Hungary	93,03	11.6
Italy	565	< 0.1
Macedonia	109	< 0.1
Moldova	12,834	1.6
Montenegro	7,075	0.9
Poland	430	< 0.1
Romania	232,193	29.0
Serbia	81,56	10.2
Slovak Republic	47,084	5.9
Slovenia	16,422	2.0
Switzerland	1,809	0.2
Ukraine	30,52	3.8
<b>Total</b>	<b>801,463</b>	<b>100</b>

---

<sup>31</sup> Basic information on the countries in the Danube River Basin [online] International Commission for the protection of the Danube River 2011-08 [accessed 30 July 2011], available at URL: <http://www.icpdr.org/icpdr-pages/countries.htm>

## 4.1 The History of Conflict and Cooperation on Danube

The Danube watershed was always perceived as a strategic region. The farthest outpost camps of the Roman Empire were built upon the banks of the Danube and the Rhine<sup>32</sup>. Since then many invaders tried to gain supremacy in the Danube basin. Among the invaders are Charlemagne's Franks, the Crusaders, Attila and the Huns, Avars, Hungarians, and the Ottoman Turks. Napoleon fought important battles of Wagram and Aspern-Essling (1809) on the river banks or while trying to cross the river. Soviet Union seized control over the Danube administration at the Danube River Conference in 1848 and finally the new integrating power – European Community facilitated solution to Gabčíkovo-Nagymaros dispute.

Then again the cooperation of the watershed states is older than the modern system of international relations. It dates back even before the beginning of the 30-Year War to the year 1616, when the Holy Roman Empire, ruled by the house of Habsburg, signed a treaty with the Ottoman Empire in Belgrade. The treaty's goal was the same for most of the succeeding treaties – free navigation on the Danube. The Danube River was and still is an important European waterway and navigation was a paramount issue from the 17th to the 20th century.

Most of these conflicts and cooperative pacts were not about the river itself, but more about territorial gains and the control of strategic region shaped by the second longest European river. The cooperation on the Danube however indicates signs of emerging institutional framework and therefore they demand more attention.

It would be useful to divide the historical development on the Danube to three stages. First is the period of treaties between the years 1616 – 1948. It could be characterised as incremental advancement towards free navigation. Second stage starts with the famous conference in Belgrade 1948 reflecting the dominance of Soviet Russia and its satellites in post-war period. The last period started in 1989 with the disbanding of the Soviet Empire in

---

<sup>32</sup> Danube was not always the final frontier for Roman Empire. As Lutwak on page confirms Dacia was a Roman province completely north of the Danube (Lutwak, 1979) p. 54

Europe and could be characterised with European integration and by the shift from navigation to the environmental issues and dealing with the legacy of communism.

#### **4.1.1 Danube 1616 - 1948**

The treaty of Belgrade divided the right to navigate the river between the Ottoman Empire and Austrian Empire. The next treaty signed in Küçük Kaynarca in 1774 reflected the defeat of Ottomans and brought the Russian Empire into the lower Danube, granting it the right to navigate its part of the river. The Treaty of Adrianople signed after the war between Russia and the Ottoman Empire in 1829 provided the legal basis for exclusion of all ships, except those of the signatory states from the Danube delta. This situation was possible through effective occupation of the Sulina Channel by Russia. This control along with the insufficient dredging of the navigable channel hampered British commercial interests in the Black Sea. The Russian aggressive politics manifested by ship quarantines and other obstruction to freedom of navigation in the Danube delta, was one of the minor factors contributing to the Crimean War in 1853.

Before the Russian politics in the lower Danube and the Black Sea region contributed to the Crimean war, one remarkable thing happened in Vienna 1815. The city was at the time a real nerve centre of the European politics and various topics were discussed by the plenipotentiaries of European powers. The Vienna conference not only gave mandate to the first ever River basin organisation in the world – The Central Commission for Navigation on the Rhine (Nielsen, 2008), but in its final Act the 1815 Vienna Conference established the freedom of navigation on international rivers as a principle of international law. (Shaw, 2008) *The navigation of international rivers along their whole course, from the point where each of them became navigable to its mouth, should be entirely free, and should not, in respect of commerce, be prohibited to any one, subject to uniform regulations of police.* (Dellapenna & Gupta, 2009)

##### **4.1.1.1 Crimean War, Sovereignty and Emergence of River Basin Organisations**

The peace Treaty of Paris 1856 ending the Crimean War (1853-1856) meant a setback for Russian influence in the region. Much more important outcome for the purpose of this thesis is the creation of The European Commission of the Danube River. The Commission

was a step forward not only to water law, but also to the system of public international law as a whole. The process that started with *1815 Final Act of Vienna Conference*<sup>33</sup> was in later (in 1856) successfully rooted in the system of international law. The number of European rivers was internationalised the same way as the Rhine and Danube. The European Commission of the Danube River was free of restraints from the territorial authority, flew its own flag and promulgated neutrality in 1856. The *Treaty of Paris* established The European Commission of the Danube River only for the period of two years, but was prolonged indefinitely after a successful restoration of the Sulina Channel in the Danube delta. Russia ultimately lost the territory at the mouth of the Danube River and its influence on the Danube watershed for nearly 90 years. It is not a surprise that after it regained control over the Danube in 1948, Russia criticised the work of the commission and installed a new order on the river.

The *Statute of The European Commission of the Danube River* was an apparent breakthrough to the so far uninterrupted sovereignty of nations, namely because of voting mechanism which allowed a majority vote and required the minority to deal with the decision. The European Danube Commission consisted of Danube riparian countries as well as other non-riparian European countries that were invited to participate. The membership of the non-basin countries served as an argument of imperialists to gain control over the Danube. The evidence of Soviet propaganda is available, e.g. in Voshchenkov article from 1969. (Voshchenkov, 1969)

#### **4.1.1.2 The Danube in the First and Second World Wars**

The European Commission of the Danube River showed remarkable institutional resiliency in the havoc of the First World War and continued functioning until the year 1916. It was recorded that the allied representatives sat side by side with the representatives of the Central powers (Woods, 1921). After the *First World War* the *European Commission of the*

---

<sup>33</sup> *Final Act of Vienna Conference* [online ]International law webpage 2011-08[accessed on 07 August 2011] available online at URL:<http://www.dipublico.com.ar/english/treaties/final-act-of-the-congress-of-viennageneral-treaty-1815/>

*Danube River* was re-established by *The Treaty of Versailles*<sup>34</sup>, but Russia and Turkey were excluded. According to Castillo-Laborde the next convention of 1921 established *the Definitive Statute of the Danube*, which reiterated that the navigation of the Danube should be free and entrusted the implementation to two different Commissions: *the European Commission of the Danube*, with jurisdiction on the maritime Danube, and the *International Commission of the Danube*, with jurisdiction on the over the navigable fluvial Danube and certain other waterways. (Dellapenna & Gupta, 2009). This dualism was ended by the Nazi rule over the Danube. Germans have united the basin and intended to colonise its fertile areas with German settlers.

In the aftermath of the Second World War Soviet Russia was finally back in the geopolitics of the Danube watershed. After long ninety years USSR did not miss the opportunity to dominate the Danube region. States acquired a new way of strengthening their power outside of their territory. The conquest was costly and regional organisations were a good tool for that purpose. On the other hand, states were able to put their sovereign powers into a new container – an international organisation, which allowed internationalisation of other international rivers and proved that a new challenge appears before the system of international law emerges the solution from riparian relations. Interstate relations are often conflictive, but these conflicts frequently serve as a catalyst for establishment of a new form of cooperation. The internationalisation of the Danube was regularly a viable solution for the victors, as is apparent from the handful of peace agreements: 1616 Belgrade, 1774 Küçük Kaynarca, 1829 Andrinople, 1856 Paris and 1921 Versailles. It suited their purposes of balancing the powers in Europe with stabilisation and indirect control of the important Danube basin region through new means in the form of an international organisation. River basin organisations, now an instrument of conflict prevention and resolution, emerged from the severe conflicts between European powers in the 19<sup>th</sup> century.

---

<sup>34</sup> Treaty of Versai (1919) [online] Documenting a Democracy 2011-08-[accessed 30 July 2011], available at URL: [http://foundingdocs.gov.au/resources/transcripts/cth10\\_doc\\_1919.pdf](http://foundingdocs.gov.au/resources/transcripts/cth10_doc_1919.pdf)

#### 4.1.2 Period 1948 – 1989

This period is influenced by Soviet return to the intuitional framework of the Danube River. Under the Soviet dominance non-riparian countries were ousted from the River basin organisation and the legacy of the “brotherly” cooperation on the Danube is causing trans-boundary disputes and environmental concerns.

#### 4.1.3 Soviet Domination on 1948 Danube Commission

The dominant role of the Soviet Union was established by the 1948 Belgrade conference. The conference was attended by the USSR, its satellite riparian countries, as well as France, Great Britain, and the U.S.. Germany was still under the control of the Four Powers and invitation to Austria was withheld by the majority of Eastern European countries on the basis of still existing state of war. Status of a consultant, but not a member of the Commission, was allowed to Austria. USA, France and Great Britain wanted to keep the freedom of navigation on the Danube to all states and re-establish the Danube Commission with the membership open to non-riparian countries. USSR was now a riparian country, because it regained control over Bessarabia. Soviets and the representatives of the USA both introduced their draft conventions, but the seven obedient soviet satellites voted for the soviet draft, Britain and France did not vote at all, claiming the whole conference illegal and that the 1921<sup>35</sup> Convention is still in force.<sup>36</sup> The result was the first major loss of the West and the Danube commission was deprived of its previous sovereignty, without any real powers over the river regime.<sup>37</sup> All the non-riparian countries were ousted and Austria

---

<sup>35</sup> Convention instituting the definitive statute of the Danube [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL:

<sup>36</sup> The Britain and France rather forget , they have voluntarily given control over the Danube to the river-bordering powers headed by Nazi Germany

<sup>37</sup> *Convention regarding the regime of navigation on the Danube*; Signed at Belgrade, on 18 August 1948 **Article 2** Navigation on the Danube shall be free and open for the nationals, vessels of commerce and goods of all States, on a footing of equality in regard to port and navigation charges and conditions for merchant shipping. The foregoing shall not apply to traffic between ports of the same State. **Article 3:** The Danubian States undertake to maintain their sections of the Danube in a navigable condition for river-going and, on the appropriate sections, for sea-going vessels, to carry out the works necessary for the maintenance and improvement of navigation conditions... The riparian States may, within their own jurisdiction, undertake works for the maintenance of navigation, the execution of which is necessitated by urgent and unforeseen circumstances.

was about to gain membership after signing a peace treaty. Germany was not mentioned in the statute at all.

It was an important victory for the USSR after many losses on the ground of the United Nations (UN), but the division was not so clear and comfortable for Soviets after all. Austria remained politically neutral; Yugoslavia was non-aligned; and, later Albania chose to remain independent (Linnerooth-Bayer & Murcott, 1996).

From this moment attention special attention would be paid to dispute over Gabčíkovo-Nagymaros dam. The entire institutional development is summed up on the next page.

**Table 6: International water treaties on the Danube River** <sup>38</sup>

<b>Year</b>	<b>Parties</b>	<b>Convention</b>	<b>Remarks</b>
<b>1616</b>	Ottoman empire, Habsburg empire	Belgrade treaty	Austrians were granted the right to navigate the middle and lower Danube, at that time under the control of the Ottoman Empire
<b>1774</b>	Russian empire, Ottoman empire	Treaty of Küçük Kaynarca	Russian merchant vessels were to be allowed passage of the Dardanelles.
<b>1829</b>	Russia and the Ottoman Empire	The Treaty of Adrianople	Provided a legal basis for excluding all foreign ships from the river delta.
<b>1838</b>	England, Austria	The Anglo-Austrian convention	Free navigation along the entire river
<b>1840</b>	Russia, Austria	The Russo-Austrian convention	Free navigation along the entire river
<b>1856</b>	Russia on one side and France, Great Britain, Sardinia-Piedmont, and Turkey on the other	Treaty of Paris	The Danube was opened to the shipping of all nations; the first Danubian Commission with the aim of supervising the river as an international waterway was set up.
<b>1919</b>	Germany, British Empire, France, Italy, Japan, United States, Belgium, Bolivia, Brazil, China, Cuba, Czechoslovakia, Ecuador, Greece, Guatemala, Haiti, Hejaz, Honduras, Liberia, Nicaragua, Panama, Peru, Poland, Portugal, Romania, Siam, Uruguay, Yugoslavia, As part of the British Empire: Australia, Canada, South Africa, India, New Zealand	The Treaty of Versailles	The Danube was declared an international river from Ulm to the sea
<b>1921 and 1923</b>	Austria, Germany, Yugoslavia, Bulgaria, Romania, Great Britain, Italy, Belgium, Czechoslovakia, Hungary, and Greece	Convention instituting the definitive statute of the Danube	Final approval of the Danube River Statute
<b>1948</b>	Russia, Yugoslavia, Bulgaria, Romania, Czechoslovakia, Hungary, Ukraina	Convention regarding the regime of navigation on the Danube	The new convention provided for the Danubian countries alone to participate in a reconstituted Danube Commission

---

<sup>38</sup> The Transboundary Freshwater Dispute Database [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL: <http://www.transboundarywaters.orst.edu/database/interfreshwaterdata.html>

Aquastat database [online] Auastat 2011-06 [accessed on 08 August 2011] available online at URL: <http://www.fao.org/nr/water/aquastat/main/index.stm>

1994	Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovak Republic, Slovenia, Ukraine	Danube River Protection Convention	Establishing of International Commission for the Protection of the Danube River (ICPDR)
------	--	------------------------------------	---

#### 4.1.3.1 Gabčíkovo-Nagymaros Dam Dispute

The history of Gabčíkovo-Nagymaros Dam Dispute (Hungary-Slovakia) spans over 30 years and still has not reached mutually acceptable cooperative solution. This issue is a dominant water dispute in Europe and had a substantial impact on international water law. Gabčíkovo-Nagymaros dispute deserves attention, because the roots of the dispute are not trivial. It connects water, politics, environment and law, while demonstrating the importance of relations and interplay between various actors of different scales in a rapidly changing environment.

The dispute culminated in the beginning of 1990. The Gabčíkovo-Nagymaros was discussed already at 1950s. The plans for installation were provided by both countries and were acclaimed without criticism. Fürst suggests that one of the reasons of Gabčíkovo-Nagymaros was enabling the Soviet war fleet to get further into the upper part of Danube. This would not be achievable merely with Gabčíkovo-Nagymaros waterworks and thus Lipschutz argument, that Soviets intention for building a different installation in Danube delta, in order to get the fleet further, seems more convincing. Even though the stretch of Danube between Bratislava and Budapest impede navigation and The Danube Commission<sup>39</sup> was created to accelerate opening of the Danube-Main-Rhine canal for ships up to 1500 tons. (Fuyane & Madai, 2001) Important for the approval of the project was the unrelenting support of the Soviet leader Leonid Brezhnev, who was known as a supporter of the idea *to divert the flow of Siberian Rivers*. (D. J. Peterson, 1993)

---

<sup>39</sup> established by the 1948 Belgrade *Danube Convention*

*The treaty concerning the construction and operation of the Gabčíkovo-Nagymaros System of Locks* (Budapest Treaty) was signed between Hungarian Socialist Republic and Czechoslovak Socialist Republic on 16<sup>th</sup> September 1977. Both countries were members of the Council for Mutual Economic Assistance (COMECON) and the treaty was favoured by Moscow as an example of ability to cooperate and command nature at the same time. The fraternal relations and COMECON are explicitly mentioned in the preamble of the treaty.<sup>40</sup> The rise in world oil prices in the 1970s, contributed to the approval of the Gabčíkovo-Nagymaros Project. (Lipschutz, 2000)

The focus area of this paper is a 200-km portion between Bratislava and Budapest. This is a stretch of land that has not been intensively developed for hydroelectric power and whose *relative shallowness and seasonal variability have posed continual problems for navigability*. (Lipschutz, 2000)

The main economic goal was a hydroelectric power generator. The secondary goals were improved navigation and flood protection. Set of works stipulated in the treaty for fulfilling primary and secondary goals was quite large for European standards.<sup>41</sup>

The project faced financial difficulties. The upper part of the project was to be completed by 1986, and the Nagymaros dam by the end of 1989. On the Hungarian side, however, the starting date was subsequently postponed to 1990, due to a growing economic crisis that began in the early 1980s. (Lipschutz, 2000)

The environmental studies were conducted, but their findings were mostly disregarded. Fürst confirms that environmental degradation in Hungary was substantial, even before

---

<sup>40</sup> Treaty concerning the construction and operation of the Gabčíkovo-Nagymaros system of locks . Signed at Budapest on 16 September 1977

<sup>41</sup> The power station in Gabčíkovo has 8 turbines and capacity of 720 megawatts. The Hungarian counterpart had 158 megawatts of installed output. The planned storage for water to run the turbines was the dam at Hrušov/Dunakiliti and then the water was to be routed downstream from the dam to a hydroelectric plant, the second dam and lock at Gabčíkovo via a 17-km-long canal running parallel to the Danube 5 km within the borders of Slovakia. The walls of the 300-650 m wide canal were to be built to the height of 9-18 m above the surrounding terrain. The whole canal was to be on Slovakian territory and...[in the] 31 km-long section of the "old" river-bed,...only 50-200 cubic meters per second would flow instead of the present 2,000 average. One hundred miles downstream, at the Danube Bend near Nagymaros, another dam with a capacity of 158 megawatts would be built. (Lipschutz, 2000)

conclusion of the 1977 Budapest Treaty. According to his accounts 40 per cent of the Hungarian population lived in regions with significant air pollution. 70 per cent of underground freshwater resources were polluted or in danger and lake Balaton was almost completely contaminated.(Fürst, 2006) This could cause unrest within the population, and the government and Hungarian Socialist Workers' Party (HSWP) were aware of the danger. It was no longer a Stalinist monolith and moderate critique of the regime was tolerated, especially within the university circles and in the environmental organisations.

At the beginning of 1981 the entire project began to come under the scrutiny of János Vargha, a plant geneticist, employed as a writer and researcher by the Hungarian Ministry of Environment and Water Management. Based on his research and assessment, Vargha tried to publish an article detailing some of the ecological impacts of "managing" the Middle Danube through the Gabčíkovo-Nagymaros GNBS. These and his subsequent efforts were banned from publication. Vargha spoke at various semi-public meetings about his findings, and tried to present them through samizdat during the following three years. He was not the only person who pointed out the potential environmental impacts of the system designed; moreover he is lionised with being the starting point of the movement of Duna Kör (Danube Circle) that emerged in opposition during the 1980s.

Government was not trying to keep unrests under control by simple oppression, but developed a form socialism called goulash socialism and shifted the production towards consumer goods allowing moderate consumerism and comfort. It did not come as a surprise that the first critique started by a study of negative impacts of Gabčíkovo-Nagymaros waterworks by Janos Vargha, who in 1984 became a leading figure of influential ecological organisations – Duna Kor (Danube circle). (Fürst, 2006) The Danube Circle was for some of its members a political, rather than environmental organisation, wherefrom they could start a full blown opposition against the regime of Janos Kádár. After his resignation in 1988<sup>42</sup> it was a signal for the Danube Circle and other environmental organisation to start a full-scale campaign against Gabčíkovo-Nagymaros waterworks. Forty thousand people protested against the project before the parliament building in Budapest and 140 000

---

<sup>42</sup> Janosz Kádár was the chairman of the ruling Hungarian Socialist Worker Party after the 1956 revolution.

signed a petition. (Lipschutz, 2000) Hungarian internal conflict was ready to shift to an international scale and dismantling of the Soviet rule in Europe was very close. In this volatile situation the right wing nationalist forces in both countries started to exacerbate the already serious conflict bringing irrational nationalistic discourse and historic reminiscences. Renaissance of the nationalism after the fall of communism was to be expected. The long suppression of nationalism by communist ideology and the newly discovered freedom of speech allowed to open a discussion about the past full of relocations of ethnic minorities living on the borders of both states.<sup>43</sup>

After unilateral suspension of the works in May, several attempts for bilateral negotiations started, but yielded no positive results. It is possible that missing institutional framework was a key reason for the failure. In February 1989 the Hungarian government went against the public tide and vowed<sup>44</sup> to accelerate works on the project. *At this time, the Dunakiliti Dam was 90% complete, the Gabčíkovo tailrace canal and dam 85%, and the Nagymaros Dam 60% towards completion.* (Fuyane & Madai, 2001) Despite the progress on the construction site, the Hungarian Parliament voted for suspending the works on Dunakiliti and abandoning the construction of Nagymaros on the 30 October 1989. An Czechoslovak expert prepared following variants:

**Table 7: Unilateral variants for finishing Gabčíkovo-Nagymaros<sup>45</sup>**

<b>Variant</b>	<b>Solution</b>
Variant A	construction of the original project
Variant B	Completion of the Dunakiliti-Gabčíkovo system, in accordance with the 1977 Treaty, without the Nagymaros lock
Variant C	Completion of the Gabčíkovo hydroelectric reservoir, exclusively on Slovakian territory. Damming at Dunakiliti (Hungary) would be replaced by the damming at Čunovo (Slovakia)

---

<sup>43</sup> 600 000 Magyars lives in the Slovak territory and makes as much as 11 per cent of its population. (Lipschutz, 2000)

<sup>44</sup> Signed a Protocol with Czechoslovakia

<sup>45</sup> Source: (Galambos, 1993) 191 p. <http://www.gabcikovo.gov.sk/doc/gabcikovo/eng/doc/>

Variant DA	Narrowing the reservoir by means of new dams on both sides along the river Danube. Commissioning of Gabčíkovo utilising the Dunakiliti weir.
Variant DC	Construction of a weir-system downstream of Petržalka suburb of Bratislava and prolonging the narrowed headwater canal along the left side dam up to the profile of the weir. Capacity of the canal would be significantly lower than the installed hydraulic capacity of the Gabčíkovo power-plant.
Variant E	Construction of a new hydro-power plant at Dunakiliti with a hydraulic capacity of 1500 cubic meters per second, discharging into the old river bed. Gabčíkovo would be working only when flows of the Danube would surpass the capacity of the new power plant. The canal would be used mainly for navigation and for discharge of a part of floods.
Variant F	The construction of HES would be stopped and structures conserved, to allow later decision.
Variant G	All the structures should be dismantled, removed and the area should be – as far as possible – restored into the original state.

After a scrutiny in Slovakia Variant A was the best overall and unilateral “Variant C”, was the best achievable considering the latest Hungarian steps. In April 1991 Hungarian government took steps for unilateral termination of the 1977 Treaty and denounced “Variant C” on the grounds of environmental damage and breach of international law. The *Danubian movement* was putting pressure on the Hungarian government to consider the termination of 1977 Treaty.

In the next stage of the conflict Hungary terminated the Treaty effective of 25 May 1992. Slovakia completed the construction of the Čunovo Dam (upstream Dunakiliti) and planned the diversion of the main stream of the Danube for the end of October 1992.

Without functioning of international water institutions in the middle of the “transition” period, both countries were totally unable to cooperate. A new actor had to step into negotiations with a strong incentive for cooperation.

A unilateral diversion of the 80 per cent of Danube water into the Variant C tailrace canal was probably the peak of the crisis. Proceeding with the “provisional solution” by Slovakian authorities resulted in charging 80 per cent of the Danube water into the tailrace channel exclusively on Slovakian territory, leaving only 20 per cent for the old riverbed of Danube, which forms the state border between both countries. Diversion of the water also caused

ecological problems in the Szigetköz region and affected underground aquifers. (Fuyane & Madai, 2001)

The European Commission entered the negotiation as a mediator and some progress was achieved in the trilateral negotiations. Despite Slovakian reluctance to accept the Hungarian precondition, that construction work on variant C be suspended for the duration of the negotiations, some solution was emerging from the new trilateral setting. Non-binding protocol<sup>46</sup> was signed to alleviate the situation in Szigetköz region and avert the damage to the underground water.

In September 1992, Prime Ministers Antall and Mečiar agreed on meeting in London at the end of October. Nevertheless, on 28 October the two sides signed a *London Agreement*,<sup>47</sup> which was a breakthrough 4-point agreement stipulating:

- suspension of all work on variant C for the period determined by the European commission;
- re-diversion of not less than 95 per cent of the normal flow of water into the old Danube riverbed;
- the establishment of a mission of three experts nominated by the European Commission to report on variant C and specify emergency measures to be taken;
- submit the case jointly to the ICJ.

The fulfilment of the first three points clearly averted the crisis and the fourth point was accomplished by a special agreement<sup>48</sup> (7. April 1993). Four questions were posed to the International Court of Justice to decide in the 1992 *London Agreement*:

**First question** for the ICJ was to decide on the basis of the Treaty and rules and principles of general international law, as well as such other treaties as the Court may find applicable, whether the Republic of Hungary was entitled to suspend and subsequently abandon, in

---

<sup>46</sup> Agreement concerning certain temporary technical measures and discharges in the Danube and Mosoni branch of the Danube, mentioned in Danube River Case, ref. 1, para. 25

<sup>47</sup> Special agreement for submission to the International Court of Justice of the differences between the Republic of Hungary and the Slovak Republic concerning the Gabčíkovo-Nagymaros project; 7 April 1993, Int. Legal Materials, Vol. 32, pp.1291-1297

<sup>48</sup> *Ibid.*

1989, the works on Nagymaros Project and on the part of the Gabčíkovo Project for which the Treaty attributed responsibility to the Republic of Hungary.<sup>49</sup>

**Second question** was whether the Czech and Slovak Federal Republic was entitled to proceed, in November 1991, to the „provisional solution” and to put it into operation since October 1992.<sup>50</sup>

**Third question** was about the legal effects of the notification (on 19 May 1992) about the termination of the Treaty by the Republic of Hungary.<sup>51</sup>

In the **last question** the Court is also requested to determine the legal consequences, including the rights and obligations for the Parties, arising from its Judgment on the questions in paragraph 1 of Article 2.<sup>52</sup>

The submission itself was of enormous importance for the international community. It was for the first time that two Central European States submitted a dispute to the ICJ for a compulsory settlement. It would be interesting to see whether the environmental consciousness of the 80s and 90s symbolised in the Rio Conference in 1992<sup>53</sup> reflects in the Judgement of ICJ.

#### ***4.1.3.2 Environmental, development and legal considerations***

The Gabčíkovo-Nagymaros case essentially revolved around the relationship between the treaty and subsequent environmental concerns. According to Shaw (Shaw, 2008) Two very different views and corresponding discourses clashed together in front of the ICJ and at

---

<sup>49</sup> **Art.2 para. 1 a)**; Special agreement for submission to the International Court of Justice of the differences between the Republic of Hungary and the Slovak Republic concerning the Gabčíkovo-Nagymaros project, 7 April 1993, Int. Legal Materials, Vol. 32, pp.1291-1297

<sup>50</sup> **Art.2 para. 1 b)**; Special agreement for submission to the International Court of Justice of the differences between the Republic of Hungary and the Slovak Republic concerning the Gabčíkovo-Nagymaros project, 7 April 1993, Int. Legal Materials, Vol. 32, pp.1291-1297

<sup>51</sup> **Art.2 para. 1 c)**; Special agreement for submission to the International Court of Justice of the differences between the Republic of Hungary and the Slovak Republic concerning the Gabčíkovo-Nagymaros project, 7 April 1993, Int. Legal Materials, Vol. 32, pp.1291-1297

<sup>52</sup> **Art.2 para. 2**; Special agreement for submission to the International Court of Justice of the differences between the Republic of Hungary and the Slovak Republic concerning the Gabčíkovo-Nagymaros project, 7 April 1993, Int. Legal Materials, Vol. 32, pp.1291-1297

<sup>53</sup> U.N. Conference on Environment and Development (UNCED) held in Rio de Janeiro

least two of them were highly incompatible. Slovakia (successor to the 1977 Treaty) viewed the project from the developmental perspective, whereas Hungary viewed the project strictly from environmentally.

#### **4.1.4 Judgement of the ICJ in Gabčíkovo-Nagymaros Case**

For the first question concerning the legality of the Hungarian suspension and subsequent abandonment of the work on the Gabčíkovo-Nagymaros Project the court voted 14 votes to 1, that Hungary's suspension of work on the project was illegal. The 1977 treaty described the project as "single and indivisible". Hungary's argument that there had been a state of emergency in 1989, which would have permitted it to suspend and abandon work on the project, was rejected by the Court. Furthermore, even if there had been a state of emergency, it would not have justified the fact that Hungary had not fulfilled the commitments of the treaty. In its judgment in Gabčíkovo-Nagymaros, the ICJ held that the above-mentioned provision has the status of customary international law, that the occurrence of the state of necessity does not terminate treaties, and that it is a temporary situation. Violations of international obligations may be excused during the duration of necessity, but once it is over, such obligations must be complied with by the party that invoked necessity. (Alvarez-Jiménez, 2011) *The Court held that Hungary had breached the Treaty by abandoning works on the Project and that it could not rely on an argued 'state of ecological necessity' justifying that breach.* (Howley, 2009)

For the second question, whether the Czech and Slovak Federal Republic was entitled to proceed, in November 1991, to the „provisional solution” and to put into operation from October 1992 the decision of the court was only ten votes against five. The court ruled that CSFR was entitled to proceed, in November 1991, to Variant C in so far as it then confined itself to undertaking works which did not predetermine the final decision to be taken by it. On the other hand, Czechoslovakia was not entitled to put that Variant into operation from October 1992. Howley argues that CSFR violated *equitable and reasonable share' of the Danube by putting Variant C into operation.* (Howley, 2009) Other reasons had probably more profound effect on the decision of the court. First argument was substantiated on reference to the project's "single and indivisible" character. Variant C violated the "joint ownership" principle. The second line of reasoning was based on rejection of the Slovakian

argument that it had followed the principle of “approximate application” because Variant C did meet that cardinal condition with regard to the 1977 Treaty.

The Legal Effects of the Termination of the Treaty by the Republic of Hungary were the main concern for Hungarian delegation. Five arguments were being presented to the court by them to support the lawful termination of the treaty by Hungary:

*State of necessity*<sup>54</sup> was invoked by Hungary. According Malcolm Shaw, a leading expert in international law, necessity may not be invoked unless the act was the only means for the state to safeguard an essential interest against a grave and imminent peril and the act does not seriously impair an Essentials interest of the other state or states or of the international community as a whole. Further, necessity may not be invoked if the international obligation in question excludes the possibility or the state has itself contributed to the situation of necessity. (Shaw, 2008) Especially the last seems very fitting. Hungary cannot invoke necessity while being directly responsible for it.

Impossibility of performance according to Article 61 of the *Vienna Convention*<sup>55</sup> is a possible cause of treaty termination if the impossibility results from the permanent disappearance or destruction of an object indispensable for the execution of the treaty. Regardless of the provision the impossibility may not be invoked by a party as a ground for terminating, withdrawing from or suspending the operation of a treaty if the impossibility is the result of a breach by that party either of an obligation under the treaty or of any other international obligation owed to any other party to the treaty. According to Shaw Impossibility of performance is intended to cover such situations as the submergence of an island, or the drying up of a river where the consequence of such events is to render the performance of the treaty impossible. (Shaw, 2008) This is clearly not the case and Hungary would have been responsible for the impossibility anyway.

---

<sup>54</sup> *Vienna Convention on the Law of the Treaties*. [online] United Nations Treaty Collection 2011-07-[accessed 30 July 2011], available at URL: [untreaty.un.org/ilc/texts/instruments/english/conventions/1\\_1\\_1969.pdf](http://untreaty.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf)

<sup>55</sup> *Vienna Convention on the Law of the Treaties*. [online] United Nations Treaty Collection 2011-07-[accessed 30 July 2011], available at URL: [untreaty.un.org/ilc/texts/instruments/english/conventions/1\\_1\\_1969.pdf](http://untreaty.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf)

*Fundamental change of circumstances*<sup>56</sup> could be invoked for terminating a treaty if two conditions are met. 1) the change was unforeseen by the parties at the time of conclusion of the treaty; 2) the existence of those circumstances constituted an essential basis of the consent of the parties to be bound by the treaty; 3) the effect of the change is to radically transform the extent of obligations still to be performed under the treaty.<sup>57</sup> The change of political and economic situation following 1989 was unforeseen in 1977, but in the view of the court did not radically transform the extent of the obligations still to be performed in order to accomplish the Project. Mechanisms in the treaty allowed for adaptation to the new situation.

The last Hungarian argument was the termination as a consequence of *material breach*.<sup>58</sup> A material breach of a bilateral treaty by one of the parties entitles the other to invoke the breach as a ground for terminating the treaty or suspending its operation in whole or in part. Hungary's main argument was that Czechoslovakia breached the treaty by unilaterally following Variant C. The careful distinguishing between lawful building of the Variant C and unlawful putting Variant C into operation in October 1992 rendered the termination of a 1977 Treaty by Hungary in May 1992 five months premature. This does not permit Hungary to invoke material breach as a ground for terminating the 1977 Treaty.

The ICJ rejected by a strong majority of 11 votes to 2 all the arguments Hungary gave for terminating the treaty such as a "state of emergency", "impossibility of performing duties", a "fundamental change of circumstances", a "material breach of the treaty by Czechoslovakia" and the "development of new norms in international environmental law".

The last question was about the legal effects of the ICJ Ruling for the Parties. The court voted 13 votes to 2 that the two parties will have to seek an agreement on the modalities of the execution of the ruling. They will have to consider the treaty as being a joint investment project for (1) the production of energy, (2) the improvement of the navigability of the

---

<sup>56</sup> Article 62, *Vienna Convention on the Law of the Treaties*. [online] United Nations Treaty Collection 2011-07- [accessed 30 July 2011], available at URL: [untreaty.un.org/ilc/texts/instruments/english/conventions/1\\_1\\_1969.pdf](http://untreaty.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf)

<sup>57</sup> Article 62, *ibid*.

<sup>58</sup> Article 60. *Ibid*.

Danube, (3) flood control, (4) regulation of ice removal and (5) the protection of the natural environment. A key issue here is the protection of the environment; this explicitly includes a "satisfactory solution" for the volume of water to be released into the old riverbed. If the parties fail to come to an agreement within six months either side can request an additional judgment.

#### ***4.1.4.1 Aftermath - Emergence of New Principles of Customary Water Law***

Hungarian delegation attempted to convince the court that new peremptory norms of environmental law had emerged since the conclusion of the 1977 Treaty. Peremptory norm is a norm of general international law, which is binding for all states (*erga omnes*), but unlike customary law it cannot be derogated by customary law, or a treaty. Article 53 of the Vienna Convention confirms that:

A treaty is void if, at the time of its conclusion, it conflicts with a peremptory norm of general international law. For the purposes of the present Convention, a peremptory norm of general international law is a norm accepted and recognised by the international community of States as a whole as a norm from which no derogation is permitted and which can be modified only by a subsequent norm of general international law having the same character.

Hungarian argument, that new peremptory norms of international environmental law render the 1977 Treaty obsolete was not accepted by the court, but on the other hand burgeoning debate about emergence principles of environmental law was commenced. Principle of sustainable development was mostly discussed in connection with the Gabčíkovo-Nagymaros judgment. Despite an absence of precise definition of *sustainable development* judges of the ICJ devoted one whole paragraph to express their view on the matter:

Throughout the ages, mankind has, for economic and other reasons, constantly interfered with nature. In the past, this was often done without consideration of the effects upon the environment. Owing to new scientific insights and to a growing awareness of the risks for mankind - for present and future generations - of pursuit of such interventions at an unconsidered and unabated pace, new norms and standards have been developed, set forth in a great number of instruments during the last two decades. Such new norms have to be taken into consideration, and such new standards given proper weight, not only when States contemplate new activities but also when continuing with activities begun in the past. This need to reconcile

economic development with protection of the environment is aptly expressed in the concept of sustainable development.<sup>59</sup>

*Sustainable development* is not perceived as a binding principle or emerging custom of international law. Rather it is more of an evaluation process for consideration of both environmental and development issues in decision-making, but not dictating a particular outcome. (Howley, 2009) On the other hand, the Vice President Judge Weeramantry of the ICJ expressed his opinion that principle of sustainable development is a principle of customary international law binding to all states except possible *persistent objectors*. This view of sustainable development as a principle of customary international law was supported by minority of judges, on the ground of a very low normative value of such rule. Regardless of being dissenting *votum*, Weeramantry's opinion started an academic and public debate on sustainability and international environmental law and according to Howley influenced several judicial decisions<sup>60</sup> of municipal law. (Howley, 2009)

There is not a substantive evidence of principle of sustainable development being a customary rule of international law. It is a useful tool for integration of development and sustainable use of ecosystems, without preferring one or the other. The Court emphasised that newly developed norms of environmental law were relevant for the implementation of the treaty while 'the awareness of the vulnerability of the environment and the recognition that environmental risks have to be assessed on a continuous basis have become much stronger in the years since the treaty's conclusion. However, the Court found that the treaty was still in force and Hungary was not entitled to terminate it. (Shaw, 2008)

#### **4.1.4.2 Conclusion and Lessons Learned**

The judgment has important consequences for the law of international watercourses and for the emergent international environmental law. In the decision on this case, the ICJ accepted that there existed a principle of "ecological necessity" whereby a state may be

---

<sup>59</sup> (11:78) Gabčíkovo-Nagymaros Project (Hungary v Slovakia) (Judgment) [1997] ICJ Rep. 7.

<sup>60</sup> Howley mentioned two accounts of two courts in the United States addressing Weeramantry's Gabčíkovo opinion in response to its use in argument and one account of influence of this principle on unsettled Australian law. (Howley, 2009)

absolved of responsibility for an otherwise wrongful act, in this case, the breach of a treaty, by invoking the law of State Responsibility on the grounds that environmental degradation threatened an “essential interest” of the State, even though Hungary was not in the state of “ecological necessity”. This state can only be said to exist when there is a real, grave and imminent peril at the time it is invoked, thereby refuting that Hungary’s more long-term concerns for its wetlands and biodiversity constituted an essential interest. (Shaw, 2008) Regarding Czechoslovakia’s (after 1992, Slovakia) unilateral diversion the decision of the Court reflected in the first place, that *pacta sunt servanda*. In the second place the Court reaffirmed principles laid out in the *1997 Convention on the Law of Non-Navigational Uses of International Watercourses*, in decreeing that Czechoslovakia had deprived Hungary of its right to an *equitable and reasonable share* of the Danube. It reaffirmed the principle of the “community of interest” in shared watercourses.

## **4.2 Contemporary Institutional Framework on the Danube**

Contemporary institutional framework in the Danube basin is an example of a paradigm shift from navigation and infrastructure building to environmental protection. Two key organisations are governing the affairs of the watershed. The Danube Commission is responsible for navigation The International Commission for the Protection of the Danube River ensures that surface waters and groundwater within the Danube River Basin are managed and used sustainably and equitably.

### **4.2.1 The Danube Commission**

The Danube Commission was described in the previous section, and its internal tensions will be partially discussed in the next section. Main purpose is still the free navigation on the Danube, but environmental topics are starting to gain importance, at least in relation to navigation. It is sufficient to add that the united Germany was admitted as a full member in 1999 and the Commission has now the following member states: Austria, Bulgaria, Hungary, Germany, Moldova, Russia, Romania, Serbia, Slovakia, Ukraine and Croatia. Perfectly aware of importance of the European Union which was proven in the Gabčíkovo-Nagymaros case, the Danube Commission has still a growing list of observer states from the EU. Among those are: Belgium, Greece, Cyprus, Turkey, France, Montenegro and the Czech Republic. Most of

the observer states have at least a vague geographical connection to the Danube watershed or it's Black sea delta. Presence of Belgium and the Netherlands make sense in connection with the Rhine-Maine-Danube Canal, but acceptance of Cyprus, which is not even remotely present near the Danube watershed, could be explained only by political and not geographic reasoning.

#### 4.2.2 The International Commission for the Protection of the Danube River

Riparian states of the Danube River signed the Convention on Cooperation for the Protection and Sustainable Use of the River Danube (DRPC)<sup>61</sup> in Sophia on 29 June 1994. The convention entered into force on 22 October 1998. Member states are: Austria, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, Moldova, Montenegro, Romania, Slovakia, Slovenia, Serbia, Ukraine and the European Union. It is important to note that after the Treaty of Lisbon entered into force in 2009, the European Community as an international legal entity was replaced and succeeded by the European Union.<sup>62</sup> As a rule of thumb a signatory country should have at least 2000 km<sup>2</sup> within the river's catchment area. This means that some countries, like Albania, Poland and Italy are only marginally involved.

The DRPC members founded an international organisation – the International Commission for the protection of the Danube River (ICPDR).

*Main objective* of the ICPDR is to ensure that surface waters and groundwater within the Danube River Basin are managed and used sustainably and equitably. Bearing in mind special efforts to control the hazards originating from accidents involving substances

---

<sup>61</sup> The text of the convention offers interesting particular provisions worth mentioning. Eloquent definition of water balance is worth mentioning: **Water balance** means the relationship characterizing the natural water household of an entire river basin as to its components (precipitation, evaporation, surface and underground run-off). In addition a component of current man-made effects originating from water use and influencing water quantity is included;

<sup>62</sup> The legal personality according to international law of European Union (European community) was not easily described before 1<sup>st</sup> January 2009; when the Treaty of Lisbon (TEL) entered into force. According to article 47 of Lisbon Treaty, which amended the Treaty of Rome (1957) and Treaty of Maastrich (1991) the

*hazardous to water*<sup>63</sup>, the ICPRD does not limit the scope of protection only to the Danube and stretches its environmental protection to the Black sea as well. The ICPRD includes the duty of cooperation and adaptation of environmental measures into the national legal systems. Principles such as *polluter pays* and *sustainable development* are present.

The mandate, defined by the DRPC includes all steering and decision-making functions except those held by the Conference of the Parties; specification and interpretation of the legal and administrative basis; establishment and further development of the institutional framework conditions, particularly the mandate to hold standing and ad-hoc Expert Groups. The Commission has a limited mandate and does not have any legal powers towards countries, agencies or others. Since adoption of the EU water framework directive, its implementation is one of the top priorities of the ICPRD.

The Commission functions through the secretariat and the various steering expert groups, such as the group on the river basin management, monitoring and assessment group, flood protection group, pressures and measures group, public participation expert group, etc. These working groups include experts from the various countries as their members. They are mostly employees of the national departments or ministries, or of specialised government agencies dealing with the Danube related problems. The Commission coordinates and monitors selected issues through the monitoring arrangements in the various countries. This includes the Accident Emergency Prevention Warning Systems and the so-called Principal International Alarm Centres. Financing the expenses of the Commission related to the functioning of the secretariat is borne by the countries which signed the Convention. Apart from this the Commission has to raise funds for any specific substantial activity it wants to undertake. The most important sources are the EU, World Bank, GEF.

---

<sup>63</sup> Art. 2 *The Danube River Protection Convention* [online] The International Commission for the Protection of the Danube River (ICPDR) 2011-07-[accessed 30 July 2011], available at online at URL: <http://www.icpdr.org/icpdr-pages/drpc.htm>

### 4.2.3 European Framework Water Directive

The European framework water directive or more formally Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy is a tool to promote the single European water policy and adapt national law systems of the EU members. The European Union has several legislative acts at its disposal. Directives are binding only for the member states to which they are addressed. It can be only one member state or a group of them. In practice are, they are mostly addressed to all member states. When a directive is adopted, member states are required to adapt their legal systems to achieve a goal of the directive. Specific means are left to responsibility of each affected member state, but it has to be adapted or more precise transposed within a specified period of time.

The framework is something new, because it implements the common goals directly into the frameworks of states. The ICPRD is only collecting information and overseeing the process of implementation.

The scope of framework initiative includes *inland surface waters*<sup>64</sup>, *ground waters*<sup>65</sup>, *transitional waters*<sup>66</sup> and *coastal waters*<sup>67</sup>. One of the objectives is to create a catalogue of all national and trans-boundary watersheds and create an appropriate national or international governing body to achieve goals of the directive. Among the goals are preventing and reducing the pollution, promoting sustainable water usage, environmental protection, improving aquatic ecosystems and mitigating the effects of floods and droughts.

---

<sup>64</sup> 2000/60/EC Art. 2 para.1, ...all standing or flowing water on the surface of the land, and all groundwater on the landward side of the baseline from which the breadth of territorial waters is measured.

<sup>65</sup> 2000/60/EC Art. 2 para.2, ... all water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.

<sup>66</sup> 2000/60/EC Art. 2 para.3, ...bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows.

<sup>67</sup> 2000/60/EC Art. 2 para.7, ...means surface water on the landward side of a line, every point of which is at a distance of one nautical mile on the seaward side from the nearest point of the baseline from which the breadth of territorial waters is measured, extending where appropriate up to the outer limit of transitional waters.

Its ultimate objective is to achieve “good ecological and chemical status” for all Community waters by 2015.

#### **4.2.4 Public Participation**

The Framework agreement, DRPC and other legal instruments specifically mention the principle of public participation, or include a provision requiring competent authorities of Member States to provide information to any natural or legal person ‘with payment of reasonable charges, in response to any reasonable request, without that person having to prove an interest, as soon as possible’. (Dellapenna & Gupta, 2009) Although previous historical international agreements for the Danube basin were closed, public participation is actively pursued by modern era instruments.

#### **4.2.5 Summary**

Institutional framework on the Danube is multilayer and work at least on three scales. The international level was always a suppressing factor. The Soviet Union in the period until 1989 was not tolerating conflicts among its satellites and the European Communities were respected as framework organisations that most of the Danube riparian would like to join in the future. The EC was more carrots and the USSR was more sticks, but neither wanted a conflict on the Danube. The second level is a bilateral relationship between Czechoslovakia until 1993, and later Slovakia as a successor<sup>68</sup> on one side and Hungary on the other side. Intuition framework was rather weak, with only 1977 Budapest Treaty and common interests in joining the EU in the future. Apart from that not many institutions were holding the countries together. Fraternity died with communism and economic cooperation was not a major unifier after dismantling of the COMECON. The last micro level was a political situation in both countries in the period of transition. Slovakian political representation was negotiating dissolution of the Czech and Slovak Federative Republic, and the Czech representation was not eager to be dragged into the problem of Gabčíkovo-Nagymaros. Slovakia was doing all the necessary steps to influence Hungary to fulfil the 1977 Treaty,

---

<sup>68</sup> *Article 73 Cases of State succession, Article 62, Vienna Convention on the Law of the Treaties.* [online] United Nations Treaty Collection 2011-07-[accessed 30 July 2011], available at URL: [untreaty.un.org/ilc/texts/instruments/english/conventions/1\\_1\\_1969.pdf](http://untreaty.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf)

but its capacities were limited. The decision to step out of the framework of the 1977 treaty and continue unilaterally with the “Variant C” left Slovakia dependant on the mechanisms of public international law that were not entirely in favour of unilateralism.

### **4.3 Geopolitical Stressors**

First stressor – significant power asymmetry was present in the Danube watershed in the past, but only for a short period, between the old and new equilibrium. For example, the 1616 Treaty of Belgrade created equilibrium between Austria and Ottoman Turks. After a period of instability, when Russia was hampering navigation and the British interest in the Danube delta, new equilibrium was established after the Crimean War. Then again the short instability period between 1916 – 1918 was ended by the Paris Treaty, reinstating all basin institutions. In 1938 they were handed over to Germany by France and Great Britain to bring *a peace for our time*. The German rule over the entirety of the Danube basin was short-lived, and after a short period of instability, Russia was back after 90 years, and the result was the Soviet era Danube Commission, which emerged from the Belgrade conference of 1948. The period was relatively stable, even though some countries were denied their rightful place in the Commission (Austria, Germany).

The cooperation in the period of 1948 – 1989 caused another completely different stressor – large water infrastructure impacts. The political consensus for cooperation was present, even though it was forced by the USSR. The outcomes of the water cooperation on the Danube were severe. Iron Gate and chiefly Gabčíkovo-Nagymaros have an impact on watershed ecosystems, which will be discussed in the next section. Missing diplomatic relations were stressors, when Germany and Austria were not allowed into the framework, without a missing peace treaty.

Pressure for decentralisation which is common within the European Union members is on one hand a welcomed step towards democracy, but it can negatively impede the river basin organisations’ ability to react, as the central authority in member state lose some of its powers to the self-governing units.

Grass root political movements in Hungary protesting against Gabčíkovo Nagymaros, and subsequently the framework did not had the public participation provisions, which would

have included the public into the planning process. This was a weakness of the Soviet Danube planning, which had severely exacerbated the Gabčíkovo-Nagymaros dispute.

Another example of a stressor for institutional framework was the disintegration of Eastern Block and eruption of nationalism in the early nineties. This was one of the factors bringing Hungary and Slovakia close to an open conflict in 1990 – 1992. *The collapse of the Soviet Union in and around 1989, and the separatist movements in the formerly socialist countries have radically transformed the geopolitics of the Danube basin and switched alliances westward.* (Linnerooth-Bayer & Murcott, 1996)

The dramatically changed political reality of the Danube region coincides with a decline in the credibility of both technocracy and centralised socialism and a rise in the awareness of ecological interdependence. (Linnerooth-Bayer & Murcott, 1996)

Another minor watershed conflict could be Yugoslavian decision not to repair the bridges on the Danube destroyed in the NATO campaign against Serbia. This conflict, as well as Gabčíkovo-Nagymaros dispute, will be solved by a very strong centripetal force of European integration.

Ethnic hostilities were a major stressor to the cooperation on the Danube. Lipschutz notes the 1920 Treaty of Trianon, which caused loss of two-thirds of the formerly Hungarian territory created a large diasporas outside of Hungary. Germans, Slovaks, Croats and Serbs, plus a mix of other ethnic and religious groups created a complex pattern of ethnicity around the Danube. Trianon led to the establishment of Czechoslovakia and Yugoslavia, the expansion of Romania and Ukraine, and the transfer of substantial numbers of Hungarians and others to each of these countries; at the same time, more than 500,000 Slovaks remained within the new borders of the country. The population of Hungary declined from some 15 million to about 6 million as a result of the loss of territory. The loss of several million of Hungarians was a source of particular bitterness and revanchism until the full incorporation of the country into the Soviet Bloc in the later 1940s. (Lipschutz, 2000)

Rise of nationalism in the Danube basin is evident from *ethnic hostilities in the former Yugoslavia.*(Linnerooth-Bayer & Murcott, 1996).

The rise in nationalism and ethnic hostilities throughout the region, especially in the former Yugoslavia, demonstrates the powerful tension between the centralised cooperation needed for addressing the economic and ecological interdependence of the Danube basin and the strong drive for national independence and decentralisation. (Linnerooth-Bayer & Murcott, 1996)

## **4.4 Biophysical Stressors**

### **4.4.1 Pollution**

Pollution is the salient stressor due to the high level of industrialisation and development of most of the users. The high usage of nutrients, industrial pollution and domestic pollution is under close scrutiny, namely because the Danube's pollution poses a threat to underground aquifers. The Rye Island (Žitný ostrov) – the biggest underground reservoir of fresh water in Europe is a trans-boundary aquifer between Hungary and Slovakia. It is one of the most closely watched aquifers for underground water pollution.

### **4.4.2 Siltation and Pollution Deposits in Large Dams**

Since the 16th century the natural course of the Danube River Basin has been altered mainly for flood defence, hydropower generation and navigation. These changes affect the ecosystems in the watershed and pose a threat to ecosystem stability. Changes in the depth or width of a river typically alternate flow rates and change the process of sediment transportation as well as the migration routes of animals. A large number of dams, dykes, navigation locks and other water infrastructures have been built with undeniable impact on natural environment. Changes in the ecosystem stability are slow and monitoring was not conducted in the distant past. In the 20<sup>th</sup> Century the main project were Construction works on a \$400 million improvement project at the Iron Gate, which began in 1964, and the two builders, Romania and Yugoslavia, asked the other riparian countries for a \$95 million contribution. A stormy debate ensued at the 1965 session of the Danube Commission, where most participants refused the bid. The dispute went before the commission's arbitration court. (Andras, 1967)

According to Petkovic the total drainage area upstream of the Iron Gate I is 577 000 km<sup>2</sup> and considerable volumes of sediment enter the reservoir (7 – 30 million tons per year). *The hot spot of Iron Gate sedimentation is pollution of the sediment, which was not adequately anticipated in the design of the dam.* The number of people living in the upstream of Iron Gate dam is 80 million. The dam was built in 1971 and during the 30 years of existence, various types of sediment-bound pollutants were deposited within the reservoir. (Bloesch, Gutknecht, & Iordache, 2005) This biophysical stressor is slowly causing tensions between the riparian.

#### **4.4.3 Environmental Damage as a Consequence of Military Action or Industrial Incidents**

NATO's bombing campaign in 1999 caused surface waters pollution. This pollution happened as a result of leakage from damaged industrial plants or pollution from poorly planned refugee centres. The pollution from leakage and burning of the industrial complexes at Novi Sad, Prahovo and Pančevo had a trans-boundary impact. According to Martinović-Vitanović & Kalafatić *part of the pollutants reached the Danube estuary and the Black Sea*(Martinović-vitanović & Kalafatić, 2000). This constitutes a rather complex problem from the point of view of public international law. This thesis is too narrow for legal implications of the NATO bombing, which is discussed in (Bostian, 2000; Schwabach, 2000) In year 2000 alone two accidental pollutions in the Tisza River Basin caused large-scale trans-boundary cyanide pollution, due to the accident in mines. (Laszlo, Csanyi, & Literathy, 2000)

#### **4.4.4 Gradual Changes Affecting Riverine Ecosystems**

The Danube Delta is the second-largest natural wetland area in Europe, providing habitat for many diverse and sometimes endangered plants, fish (at least 100 species of fish out of 227 found in all of Europe), birds and mammals. (Linnerooth-Bayer & Murcott, 1996) This

fragile ecosystem is protected by the *Convention on Wetlands of International Importance especially as Waterfowl Habitat* (Ramsar Convention)<sup>69</sup>

#### 4.4.5 Floods

The precipitation is unevenly distributed in both time and space in the Danube river basin. The annual precipitation varies from 2,000 mm per year in the upper basin, to only 500mm in the plains. The natural flow regime is strongly influenced by hydraulic structures and intensive water use in the basin. Normal seasonal variability leads to low water levels in summer and fall; the region has also been subject to unpredictable and very serious flooding (a problem endemic to such river bottom areas). (Lipschutz, 2000)

Serious floods in 1954 in Hungary and 1965 in Czechoslovakia (as well as in 1996), the gradual worsening of navigation in the Middle Danube region along with the rise in world oil prices in the 1970s contributor to the movement on the project.

#### 4.5 Socioeconomic Stressors

The intensity of agricultural, industrial and urban uses has created problems of water quality and quantity, affected the natural ebb and flow of water in the basin's numerous wetlands and reduced biodiversity.(Ahmad et al., 2000) The Ramsar Convention on wetlands<sup>70</sup> promotes in its Article 5 international cooperation on trans-boundary wetlands:

##### Article 5

1. The Contracting Parties shall consult with each other about implementing obligations arising from the Convention especially in the case of a wetland extending over the territories of more than one Contracting Party or where a water system is shared by Contracting Parties. They shall at the same time endeavour to coordinate and support present and future policies and regulations concerning the conservation of wetlands and their flora and fauna.

---

<sup>69</sup> *The Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat* [online] The Ramsar Convention on Wetlands 2010-02 [accessed 06 August 2011] available online at URL: [http://www.ramsar.org/cda/en/ramsar-documents-texts-convention-on/main/ramsar/1-31-38%5E20671\\_4000\\_0](http://www.ramsar.org/cda/en/ramsar-documents-texts-convention-on/main/ramsar/1-31-38%5E20671_4000_0)

<sup>70</sup> *Ibid.*

The Danube institutional framework for wetland administration is enhanced with several organisations for trans-boundary wetland administration.

## **4.6 Danube Partial Conclusions**

History of Danube watershed was a long struggle for dominance in the region. The Russian attempts to dominate the Danube delta in the first half of the 19<sup>th</sup> Century resulted in establishment of The European Commission of the Danube River, which was an apparent breakthrough to the so far uninterrupted sovereignty of nations. Once the international organisations acquired their share of sovereignty, they started to safeguard their existence. The main goal was to keep the newly internationalised river open for ships of all countries, but Danube water institutions were also used to influence regional management. Non-riparian countries of France and Great Britain used it to stabilise the Danube watershed and oust Russia out of the Danube delta after The Crimean War. The USSR returned them the favour back in 1948 expelling non-riparian countries and reinforcing their rule over the watershed. The 1948 Danube Commission de-internationalised the river and made the navigation exclusive to riparian countries. The socialist planning and Soviet approach to natural resources allowed environmentally unsound project like Gabčíkovo-Nagymaros dam and Iron Gate I. and II. These behemoth structures are the legacy which has caused problems, when the Soviet rule disappeared and newly independent countries like Hungary and the Czech republic (later only Slovakia) started to contest the meaningfulness and environmental effects of the Soviet era water infrastructure. This led to Gabčíkovo-Nagymaros dispute, which changed the global water rules profoundly.

### **4.6.1 Shift of Cooperation Focus**

The Danube water has changed the focus of cooperation substantially. In the first stage (1616-1948) the focus was predominantly on navigation. In the second stage (1948-1989) navigation was still the main issue, but the brotherly relations and cooperation of COMECON countries was reaffirmed by several controversial infrastructure projects. One of them – Gabčíkovo-Nagymaros system of locks had detrimental effects on environment, but beneficial effects on a dissent movement in Hungary. A mixture of environmental, political and nationalistic reasons led Hungary and Slovakia into the dispute. Gabčíkovo-Nagymaros

was the most important water dispute addressed by the International Court of Justice. 1997 Judgement of International Court of Justice reaffirmed that principle of *equitable and reasonable utilisation* along with the principle of *no appreciable harm* as the customary rules of international law.

#### **4.6.2 Structural Analysis**

The Danube watershed has a structure of interconnected network. The European Union is an important actor of the water cooperation. It has become a member of the ICPRD and the Danube Commission 2000. After the two enlargements of the European Union in 2004 and 2007, the Danube region will be strongly influenced by coordinated European policies. It is apparent, that *acquis communautaire* will be shaping the policies of the Danube countries. The framework water directive is already changing municipal and international mechanism towards integrated trans-boundary watershed management. The Danube is one of the European TEN-T<sup>71</sup> water corridors and its protected areas are under Natura 2000. The Danube illustrates how a river basin organisation can provide a basis for negotiations on broadening needs. It has shown how the broader forces of regional integration can encourage cooperation along the river through the building of a robust intuitional framework.

Water institutions are deemed important or even indispensable in the European context after 1856. In the turbulent times of both world wars and after the collapse of the Iron Curtain, the Danube commission was always perceived as an asset and thus rather dominated, than dismantled. This could also signify that countries do not see the river basin organisations as politically biased.

#### **4.6.3 Addressing the Stressors**

The institutional framework changed and adapted to political realities, and work differently under different dominant powers, but it was always transformed and never disbanded. The rapid response to the change of cooperation focus from navigation to the environmental

---

<sup>71</sup> The Trans-European Transport Network Executive Agency

protection is a remarkable example of the high institutional capacity and adaptively. The contemporary stressors in the basin are mostly environmental and both international (ICPRD, Danube commission) and European (Framework Water Directive) are addressing the salient environmental challenges. The main advantage however is the unique linkage, between regional cooperation and domestic legal system of riparian countries on Danube existing through indirect applicability of *acquis communautaire*.

## 5 The Ganges-Brahmaputra-Mengha

### 5.1 Physical Geography and Human Geography

The Ganges-Brahmaputra-Meghna basin is one of the most resource-rich basins in the Third World, but also one of the most impoverished (Elhance, 1999). The Ganges River is a part of the larger Ganges-Brahmaputra-Mengha (GBM) watershed shared by five riparian countries.<sup>72</sup> The region covers a geographical area of about 1.75 million sq. km., stretching across Bangladesh (7.4 per cent), India (62.9 per cent), Nepal (8.0 per cent), Bhutan (2.6 per cent), and Tibet, China (19.1 per cent). (Ahmad et al., 2000) According to the Transboundary Freshwater Dispute Database, the basin population is 581 million with the population density of 360 people per sq. km. Changes in the basin affect almost 9 per cent of the world's population. Combined peak discharge of The Ganges-Brahmaputra-Mengha is the second only to the Amazon river, which is being the largest river system in the world. The Ganges rises from the Gangotri glacier at an altitude of about 7,010m above sea level. The river flows through Uttar Pradesh Bihar and West Bengal. Approximately 40 km below Farakka it bifurcates into two arms. *The left arm is called Padma and flows eastwards into Bangladesh and its right arm called Bhagirathi continues to flow south in West Bengal. The Bhagirathi flowing west and south west of Calcutta is called Hooghly.* (M. M. Rahaman, 2001) Headwaters of the basin are fed by the Himalayas –the largest snow covered area outside the Polar Regions.<sup>73</sup> There is a burgeoning debate on the impact of global warming on shrinking of the Himalayas glaciers. Discussion about causes of biophysical stressors is vital, however the institutional readiness to react to extreme weather effects and climate changes should be implemented regardless the causes. It could be either drought or flood or both events in succession.

---

<sup>72</sup> The sixth is Myanmar, which is sharing only negligible 80 km<sup>2</sup> of the Ganges-Brahmaputra-Mengha basin. *International River Basin Register*. [online] Transboundary Freshwater Dispute Database. 2011-07-[accessed 30 July 2011],. available at URL:<<http://ocid.nacse.org/tfdd/>>

<sup>73</sup> Himalayan water storage system is composed of 15,000 glaciers, 1,400 km<sup>3</sup> of snow-cover;

Elhance stresses out that nowhere in the world are the benefits of cooperation greater and penalty for non cooperation more devastating than in the Ganges-Brahmaputra-Mengha watershed. (Elhance, 1999) China and India – the two emerging superpowers of the 21<sup>st</sup> century are separated by the features of physical geography, which *effectively prevent China from challenging the dominant position of India*. Nepal and Bhutan are controlling the headwaters, which gives both states the advantage of having the headwaters of The Ganges on their territory. The rivers of Nepal contribute by more than 40 % to the total flow of the Ganges and over 70 % of its dry-season flow. Water storage potential in Nepal is 88 bcm. (M. M. Rahaman, 2001) While China is geographically separated by Himalayas, India plays the role of a local hegemonic power.

The Ganges River is significantly important for Bangladesh. The silt from the Ganges has built a large part of Bangladeshi territory. Today nearly one-third of the total area and about 40 million people of Bangladesh are directly dependent on the Ganges basin for their livelihood (Swain, 2004).

The institutional history of the Ganges-Brahmaputra-Meghna watershed is dating back to spread of Harrapan civilization onto the Gangetic plane 1900 years BCE.

**Table 8: Country Areas in the Ganges-Brahmaputra-Meghna River Basin<sup>74</sup>**

Basin	Countries included	Area of country in basin (km <sup>2</sup> )	As % of total area of the basin	As % of total area of the country
<b>The Ganges</b>	India	860 000	79	26
	China	33 500	3	0,3
	Nepal	147 500	14	100
	Bangladesh	46 300	4	32
	Bhutan	-	-	-
<b>Brahmaputra</b>	India	195 000	36	6
	China	270 900	50	3
	Nepal	-	-	-
	Bangladesh	39 100	7	27
	Bhutan	38 400	7	100
<b>Meghna</b>	India	47 000	57	1
	China	-	-	-
	Nepal	-	-	-
	Bangladesh	35 000	43	24
	Bhutan	-	-	-
<b>Total</b>	India	1 102 000	64	33
	China	304 400	18	3
	Nepal	147 500	8	100
	Bangladesh	120 400	7	83
	Bhutan	38 400	3	100

## 5.2 Evolution of Water Law on the Indian Subcontinent

The purpose of this chapter is to identify general patterns in evolution of the legal framework on Indian subcontinent. Special attention will be paid to changes of the legal systems and thereof resulting comprehension of the water regulation in India, which has the main influence on the negotiation of Treaties establishing the Intuitional framework in the Ganges-Brahmaputra-Meghna basin.

### 5.2.1 Water Rules and Decline of the Harrapan Civilisation

The first mentions of the Harappa civilisation in the Indus valley date as back as 2900 BC and between 1900 – 1300 BC the Harrapan people went on to settle the fertile Gengetic plane. Wittfogel included the civilisation, which was flourishing mainly around 2500 BC

---

<sup>74</sup> Aquastat database [online] Auastat 2011-06 [accessed on 08 August 2011] available online at URL: <http://www.fao.org/nr/water/aquastat/main/index.stm>

amongst so called Hydraulic civilisations. His theory about *hydraulic civilisations* summed up in his book *Oriental Despotism* (Wittfogel, 1957) was profoundly influenced by environmental determinism. The Author asserts that irrigation and a large scale water infrastructure required a literate bureaucracy apparatus to organise the labour force as well as top-down despotic hierarchy. The combination of these created *hydraulic empire*: despotic, powerful, stable and wealthy states on major rivers. Wittfogel's crude environmental determinism was criticised by Toynbee. Wolf rightly points out that Toynbee himself was influenced by environmental determinism (Wolf, 2007), theory of creative minority in his lifetime work called *A Study of History* serves as a good example. A creative minority is an elite group in the core of every successful civilisation which knows how to appropriately respond to a challenge. This challenge was mostly, but not exclusively, environmental. Challenges which were met successfully led to further challenges accelerating the development of the civilisation. The creative minority builds institutions – religious first, and then secular – to meet the successive row of challenges. Relevance of Toynbee's ideas will be tested by the Indian civilisation, which he held in great esteem. Even though Toynbee was heavily criticised by historian circles, and also both authors have criticised each other, they are forefathers of the vast literature linking politics and environment. Wolf mentions Homer Dixon in the water discourse debate about the link between the environment and politics (Wolf, 2007), but authors like Jared Diamond could be mentioned as followers if the debate Toynbee and Wittfogel started.

According to Weber, the decline of Harrapan civilisation was connected with changes of the river flow and corresponding changes in agricultural strategy, which led to fragmentation of the culturally integrated Harrapan civilisation (S. Weber, 1999). Other theories are connected with the change of flow, climatic change or conquest by the Aryan people. Toynbee would probably blame the loss of creativity in creative minority and Wittfogel, would blame the hydraulic base of the bureaucratic class. With regard to outlining principles of this thesis, the reason for demise of the Harappan civilisation would be environmental stressors (the change of flow of Indus, change precipitation, possibly Aryan invasion) and weak institutional framework to buffer these changes.

## 5.2.2 Mauryan Water Rule System

The late Harappan civilisation in the Indus valley was succeeded by two civilisations – Mauryan and Mughal. The Mauryan Empire ruled the Gangetic plane from 321 to 185 BCE. Gupta asserts that *at this time, Jainism and Buddhism were born as counter religious forces to promote conservation of natural resources.* (Dellapenna & Gupta, 2009). She also found out that by 400 CE, there was a decline in agricultural production – possibly because of water shortages. *This decline was accompanied by decline in soil fertility, and/or the growth of human population.* This stressful period was overcome by the creative minority, which developed new tank technologies and improved dams and canals. If Toynbee's theory is to be confirmed, even the abovementioned environmental challenges had to have an exact intensity. Too intense challenges would crush the civilisation and too weak challenges would not provide sufficient impetus for development of new technologies and institutions. Considering water institutions and technology, most of the past is filled with examples of genuine creativity, but also ambiguous rules governing water resources.

The Laws of Manu or Manu Smriti were written in 200 – 100 BCE. They are the fundament of Hindu Law, and they still profoundly influence the Indian society. Gupta provides a handful of evidence of water law in her book (Dellapenna & Gupta, 2009), but a thorough study of Laws of Manu in Bühler translation provided a significantly smaller number of water-related rules concerning protection of artificial water sources, and protection of water quality from biological pollution:

But he who shall take away the water of a tank, made in ancient times, or shall cut off the supply of water, must be made to pay the first (or lowest) amercement. (Buhler, 1886)<sup>75</sup>

Let him never void faeces or urine, facing the wind, or a fire, or looking towards a Brahmana, the sun, water, or cows. (Buhler, 1886)<sup>76</sup>

According to Gupta the destruction of embankments was prohibited by the Laws of Manu and the use of water bodies as boundaries between villages was encouraged to ensure that as many villages as possible had access to water. (Dellapenna & Gupta, 2009)

---

<sup>75</sup> Laws of Manu, Chapter IX. Art. 281

<sup>76</sup> Laws of Manu, Chapter IV. Art. 56

The other sacred text of Hindus –Kautilya's Arthashastra is more specific in defining water rules. Kautilya's Arthashastra is a treatise identified with Cāṇakya (authorship is disputed), who was the Prime Minister of the Maurya Empire. It was written in 4<sup>th</sup> or 2<sup>nd</sup> century BCE. Due to its extreme pragmatism Max Weber<sup>77</sup> likened it to Machieavelli's *Prince*. There is rather high occurrence of water-related rules in the text, the word water being used 190 times. What is even more striking is the variety of uses protected by law, which are displayed in the book. Rules are very specific when appropriate, but on the other hand they are vague and ambiguous whenever the lawmaker deems it necessary. The book also gives advice to the king on how to develop the land:

He shall also construct reservoirs filled with water either perennial or drawn from some other source. Or he may provide with sites, roads, timber, and other necessary things those who construct reservoirs of their own accord.<sup>78</sup> There shall be a water-well for every ten houses.<sup>79</sup> Land and water ways are the roads of traffic.<sup>80</sup>

Or how to choose a suitable strategic place for the capital city:

Or with ready preparations for flight the king may have his fortified capital as the seat of his sovereignty in the centre of his kingdom: in a locality naturally best fitted for the purpose, such as the bank of the confluence of rivers, a deep pool of perennial water, or of a lake or tank, a fort, circular, rectangular, or square in form, surrounded with an artificial canal of water, and connected with both land and water paths (may be constructed).

It is interesting to compare the fees for using water, which was determined by the level of amelioration of the water source. This amelioration was covered by king's exchequer and collected by king's officials.

Those who cultivate irrigating by manual labour shall pay 1/5th of the produce as water-rate; by carrying water on shoulders 1/4th of the produce; by water-lifts, 1/3rd of the produce; and by raising water from rivers, lakes, tanks, and wells, 1/3rd or 1/4th of the produce.<sup>81</sup>

---

<sup>77</sup> "Politik als Beruf," *Gesammelte Politische Schriften* (Muenchen, 1921), pp. 396-450 in: (M. Weber, 2004)

<sup>78</sup> Book 2, Chapter 1, page 62

<sup>79</sup> Book 2, Chapter 1. Page 68

<sup>80</sup> Book 2, Chapter 1. Page 78

<sup>81</sup> Chapter XVI., Book ???, page 165

Some laws were flexible, while others are surprisingly rigid. A very precise law of construction is imposed on royal subjects:

according as the rainfall is more or less, the superintendent shall sow the seeds which require either more or less water.<sup>82</sup>

...all permanent houses shall be provided with a dunghill, water course, and a well. From each house a water course of sufficient slope and 3 padas or 11 aratnis long shall be so constructed that water shall either flow from it in a continuous line or fall from it (into the drain).<sup>83</sup>

Remarkable combination of the principle of *river flow integrity* combined with the *historic use*, which is known to international water law, could be traced in Chapter IX. This was amended by rules alleviating taxes and protecting unrighteous usage of water flowing between upstream and downstream riparian.

If the owner of any one of the following, viz., wet-fields, parks, or any kinds of buildings, causes damage to the rest owned by others, the fine shall be double the value of the damage. The water of a lower tank shall not submerge the field irrigated by a higher tank.<sup>84</sup>

For improving or extending water-works, taxes shall be remitted for three years.<sup>85</sup>

PERSONS who obstruct, or make any kind of mischief with the flow of water intended for cultivation shall be punished with the first amercement.<sup>86</sup>

When a person breaks the dam of a tank full of water, he shall be drowned in the very tank; of a tank without water, he shall be punished with the highest amercement; and of a tank which is in ruins owing to neglect, he shall be punished with the middle-most amercement.<sup>87</sup>

The resilience of agricultural practices to rainfall variability was strengthened by the following rule. Various crops were sown according to rainfall patterns. This rule has various provisions for different crops and, therefore only the first and most important general rule is cited in the text:

---

<sup>82</sup> Chapter XVI., Book ???, page 164

<sup>83</sup> Chapter VIII. BUILDINGS, page 239

<sup>84</sup> Chapter IX. Disputes, page

<sup>85</sup> Chapter IX. Disputes, page

<sup>86</sup> Chapter X. Disputes, page

<sup>87</sup> Chapter XI., page 325

Hence, i.e., according as the rainfall is more or less, the superintendent shall sow the seeds which require either more or less water.<sup>88</sup>

The space devoted to examples of water-related rules is only justifiable with careful analysis of the context, meaning and usability of aforementioned laws. Arthashastra does not provide rules for international watersheds, but Gupta discovered a rule regulating the water flow from one owner to the other:

The natural flow of water from a higher to a lower tank shall not be stopped unless the lower tank has ceased to be useful for three consecutive years. Violation of this rule shall be punished with the first amercement. The same punishment shall be meted out for emptying a tank of its water. Buildings of any kind, neglected for five consecutive years shall be forfeited, except in calamities<sup>89</sup>

If we accept the evidence that hydraulic challenges were a catalyst for civilisation development (Cosgrove, 2003; Dellapenna & Gupta, 2009; Wittfogel, 1957; Wolf, 2007), than municipal Indian law confirms two important findings. Water was a subject of extensive and elaborate regulation in ancient India. The general patterns in municipal Indian water laws suggest the biophysical challenges, such as rainfall variability, were met by specific provisions in the ancient Indian codices of Manu and in the Kautilya's Arthashastra. Socioeconomic development was secured by tax holidays for constructors of water infrastructure and with the severe punishments for those who destroyed such installations. It is evident that strategic value of water routes as the means of transportation and enhancement of defence were also taken into account by the aforementioned laws.

### **5.2.3 On the Way to Modernity**

The span of the last 2000 years was eventful and the evolution of water law on the Indian subcontinent continued. In the 4<sup>th</sup> century the Gupta Empire stretched across fertile valleys of Indus and The Ganges and created a complex system of administration and tax collection, which became a model for later kingdoms in the area. The Mughal period of Indian history introduced Muslim Water Law, which is extensively dealt with by the chapter devoted to

---

<sup>88</sup> Chapter XXIV. Page 164

<sup>89</sup> Chapter IX. Disputes, page

the evolution of water law in Euphrates and Tigris basin. The key events of the colonial period are covered in the table. *The British did not interfere with local rules and customs unless it interfered with their policies* (Dellapenna & Gupta, 2009) until the 1857 revolution or so called *Sepoy mutiny*. The 1857 rebellion was by and large confined to the northern Indian Gangetic Plain and central India. {map}

After the revolution Britain began to invest in and regulate the canals and irrigation facilities. (Dellapenna & Gupta, 2009) Alongside the investments came the legal system, which was based on common law and introduced more stringent protection of the owners of the land. The right to reasonable portion of the flow of the watercourse as well as the right to an unlimited use of underground sources under the proprietors land were introduced. Government responsibility was set in the 1873 Northern India Canal & Drainage Act, which is still in force today. The largest contiguous irrigation system in the world in the upper Indus watershed is managed according to this Act despite the fact that this is an international basin shared by India and Pakistan. This area developed by British engineers in the 19<sup>th</sup> and 20<sup>th</sup> century is still administered according to this 138-year-old statute. Colonial law also divided responsibilities between the central government and the regions/states of India. States and provinces are in charge of water supply, canals, water storage, irrigation and hydropower. Conflicts between states/provinces were common and Governor General of India had a jurisdiction to solve them.<sup>90</sup> The British rule in India brought stabilisation of agricultural production. British engineers built irrigation canals combined with waterways in the Ganges fertile plain to combat drought and support the trade. The largest of these irrigation systems branched out from the Ganges River with over 7,650 miles of waterways supporting 2,500,000 acres of farmland. (Griffiths, 1965) This is a period when the creative minority of the Indian civilisation was temporarily replaced by the creative minority of the British. Changes were profound and the modernity of technological solutions and incompatibility of laws was a burden that complicated water management in India and affected the transboundary water situation with its neighbours.

---

<sup>90</sup> The government of India act, 1935 in: (Anand, 1944)

After the Indian Independence in 1947 the water situation between India and Pakistan on the Indus was critical. Many researchers have investigated the conflict between Pakistan and India over the Indus. (Ahmad et al., 2000; D'Amato & Engel, 1995; Elhance, 1999) The Indus Water Treaty (1960) is a well-known example of a resilient water institution. Focus of this thesis is on the Ganges watershed for many reasons. It has more intricate network of institutions and greater power asymmetry between riparian states. The water treaties emerging out of disputes have a more elaborate structure and challenging stressors are more various in the Ganges-Brahmaputra-Meghna watershed.

The development of India, from the British colonial rule to independence, has caused intrastate disputes and even intrastate conflicts between individual states of the Indian Federation. Radical changes from *traditional commons* systems to industrial and market capitalism caused numerous conflicts. Widely publicised are the examples of international companies like the Pepsi Company and Coca-Cola Company losing their licenses to use groundwater after a drought increased competition on water resources (P H Gleick, Cooley, & Katz, 2006). Water, forests, and land remain highly contentious issues in India (Shiva, 1991).

The usage of colonial laws such as the 1894 Land Acquisition Act<sup>91</sup> may be violating the Federal Constitution as the Supreme Court disclosed in its judgement:

[w]ater is the basic need for the survival of the human beings and is part of right of life and human rights as enshrined in Article 21 of the Constitution of India (Narmada Bachao Andolan v Union of India 2000) (Dellapenna & Gupta, 2009)

#### **5.2.4 India and Nepal**

Water relations between Nepal and India date back to 1910s. British India approached Nepal to build the dam on the Mahakali River<sup>92</sup>, which constituted a border between British

---

<sup>91</sup> Land Acquisition Act 1894 [online] Government of India - Ministry of Rural Development 2011-07 [accessed on 08 August 2011] available online at URL: <http://dolr.nic.in/hyperlink/acq.htm>

<sup>92</sup> Mahakali si called Sarada in India (Baillat, 2004)

India and the Kingdom of Nepal. According to Baillat a land swap<sup>93</sup> was agreed upon in 1920 Mahakali treaty.(Baillat, 2004) As a result of this land exchange, the whole project was to be located within the Indian Territory. This project with unequal benefits was frequently used to manipulate with the public opinion after both states gained independence in 1947, resp. 1951. Treaties regarding Kosi (1954), Gandak (1959 and Mahakali were negotiated between the independent riparian. The treaties strove to address flood control, irrigation and hydropower generation.

---

<sup>93</sup> 4,000 acres of the left bank in exchange for an equivalent forested area further to the east as well as Rs. 50,000 compensation for Nepal (Baillat, 2004)

**Table 9: Chronology of Main Water Treaties between India and Nepal**

Year	Treaties	Main aspects
1954	Agreement between the government of India and the government of Nepal on the Kosi Project	Hydropower
1959	Agreement between His Majesty's government of Nepal and the government of India on the Gandak Irrigation and Power Project	Nepal will continue to have the right to withdraw for irrigation. Such supplies of water, as may be required from time to time. Note that this wording is verbatim from the 1954 agreement. Shortages will be pro-rated across both countries.
1966	Amended agreement between His Majesty's government of Nepal and the government of India concerning the Kosi Project	Stone, gravel, ballast, and timber compensated by India to Nepal. India pays compensation to Nepal for the loss of the land and immovable property flooded by the project.
1978	Agreement between Nepal and India on the renovation and extension of Chandra Canal, Pumped Canal, and distribution of the Western Kosi Canal	This treaty addresses maintenance and new construction. The Chandra canal will be restored (by removing earth from the channel) to its previous 11 cumec capacity. Repairs to the headworks will also take place.
1996	Treaty between His Majesty's government of Nepal and the government of India concerning the integrated development of the Mahakali River including Sarada Barrage, Tanakpur Barrage, and Pancheshwar Project	The treaty makes provision for equal entitlement in the utilisation of water from the Mahakali River without prejudice to respective existing consumptive uses.
2008	Third meeting of the Nepal-India Joint Committee on Water Resources	The Pancheshwar Multipurpose Project was identified as a priority project

#### **5.2.4.1 The 1954 Kosi River Treaty**

The biggest river in Nepal is also causing a lot of transboundary problems because of high silt content in the water. The Kosi River has a laterally unstable riverbed, which routinely cause disasters in Nepal and Indian state of Bihar. Therefore India was eager to invest into flood control, but the infrastructure<sup>94</sup> had to be built on the Nepalese part of the river. Kosi River Treaty<sup>95</sup> was subject to a large controversy within Nepal on the grounds of sovereign territory infringement. (Baillat, 2004) *Article 3 para ii* and *Article 5* of the Kosi River Treaty provided that India would acquire the territory in future by a treaty:

---

<sup>94</sup> A barrage and embankments were built in a special site located 8 km inside Nepal. Two canals were planned to drain water from either side of the barrage thereby transferring it for irrigation to the Indian territory. Finally a 20,000 kW power house was to be located along the Eastern Canal on the Indian territory. (Baillat, 2004)

<sup>95</sup> Agreement between the government of India and the government of Nepal on the Kosi project

*Art 3. para (ii):* The land required for the purposes mentioned in Clause 3 (i) above shall be acquired by the Government and compensation therefore shall be paid by the Union in accordance with provisions of clause 8 hereof.

*Art 5.: SOVEREIGNTY AND JURISDICTION* - The Union shall be the owner of all lands acquired by the Government under the provisions of clause 3 hereof which shall be transferred by them to the Union and of all water rights secured to it under clause 4 (i)

Compensation for the land used for construction and submerged land is to be determined according to *Article 8* which is too long to be included in an unabridged version. The compensation should be in cash and land. Various types of land uses are distinguished for the planned land swap. The entire project was planned, financed and supervised by India. (Baillat, 2004). Due to significant criticism and weak position of the Nepalese government, the treaty had to be revised and amended 1966.<sup>96</sup> After a political turmoil mentioned in the section discussing geopolitical stressors, signatory states drew up an amendment stipulating in Article 5, para (i), as follows:

All the lands acquired by HMG under the provisions of clause 3 hereof as of the date of signing of these amendments shall be leased by HMG to the Union for a period of 199 years from the date of the signing of these amendments at an annual Nominal Rate.

After that, the constructions would become Nepal's property in exchange for agreed compensations. In addition to change from cession of territory to a mere lease of the territory, Nepal asked for a realignment of the canal in order to increase its own irrigated acreage and for some royalties on power<sup>97</sup>.

---

<sup>96</sup> *Amended agreement between His Majesty's government of Nepal and the government of India concerning the Kosi Project.* [online] Transboundary Freshwater Dispute Database. 2011-07-[accessed 30 July 2011],. available at URL:<<http://ocid.nacse.org/tfdd/>>

<sup>97</sup> Irrigated acreage in Nepal increased from 30,000 to 70,000 acres; Nepal acquired royalty on 50% of power generated and utilised in India as well as 50% of the power generated in India and imported to Nepal. Nepal required also that India construct transmission lines to mutually-agreed points on the India-Nepal border. (Baillat, 2004)

#### **5.2.4.2 1989 Gandak Treaty**

Gandak treaty<sup>98</sup> was less controversial than the aforementioned Kosi Agreement, namely because no sovereign territory cession was required. The treaty is apparently more just and thus less likely to cause protests in Nepal. Two out of five channels are built entirely in India, one is in Nepal and one is flowing from India to Nepal and one from Nepal to India. Being an upstream riparian on one channel and a downstream riparian on a different channel helps to ease possible tensions. It is important to distinguish between cession of the land and simple acquisition of property. Article 11 of the Gandak Treaty<sup>99</sup> clearly confirms no change of borders between signatories:

Nothing in this Agreement shall be deemed to derogate from the sovereignty and territorial jurisdiction of His Majesty's Government in respect of lands acquired by His Majesty's Government and made available to the Government of India for investigation, execution and maintenance of the Project.

The Gandak Project was commissioned in 1971 and was completed in 1985. *Nepal obtained some important concessions from India in the revised Kosi and Gandak Agreements.* (Baillat, 2004)

#### **5.2.4.3 1996 Mahakali Treaty – A Lasting Solution ?**

The Mahakali River is the fourth largest river of Nepal and it forms the border between Nepal and India. The first objective of the 1996 Mahakali Treaty is to authorise the already built Tanakpur Project completed before signing the treaty. It was built on the land which was acquired in the Mahakali (Sarada) Treaty as early as 1920. The Treaty provided that 4,000 acres (16 km<sup>2</sup>) of the Nepalese left bank of the Mahakali River be exchanged for an

---

<sup>98</sup> *Agreement between His Majesty's government of Nepal and the government of India on the Gandak Irrigation and Power Project* [online] Transboundary Freshwater Dispute Database. 2011-07-[accessed 30 July 2011],. available at URL:<<http://ocid.nacse.org/tfdd/>>

<sup>99</sup> *Agreement on the Gandak Irrigation and Power Project* [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL: <http://ocid.nacse.org/tfdd/tfddddocs/233ENG.pdf>

equivalent area of a forested land (see above). The second objective is to legalise/authorise the Tanakpur Project constructed in 1992. (Jain, Agarwal, & Singh, 2007)<sup>100</sup>

Following the conclusion of this Treaty, the earlier understandings reached between the parties concerning the utilisation of the waters of the Mahakali River from the Sarada Barrage and the Tanakpur Barrage, which have been incorporated herein, shall be deemed to have been replaced by this Treaty.<sup>101</sup>

The last but not the least important provisions rule the joint operation of the aforementioned water works. The scheme for water allocation is very rigid and guarantee exact minimal flows for Nepal. The treaty has a fixed allocation mechanism in Article 1.

The change of government from absolute to parliamentary monarchy opened a new door for water negotiations. The mutual Indo-Nepalese relations at the last days of absolute monarchy were at their lowest. Crisis in renegotiation of trade and transit treaties led to a blockade of Nepal by India. (Dhungel & Pun, 2009). New governments were determined to improve the relations and signed a series of agreements in 1991. Among the treaties was the Memorandum of Understanding (MoU) signed on 6 December 1991.<sup>102</sup> Unfortunately, the treaty text is not available in the most comprehensive databases of treaties kept by the UN Secretariat.<sup>103</sup> The author had to work with a second hand source published in the peer reviewed magazine.<sup>104</sup>

There was some confusion about the binding nature of the treaty. The misunderstanding was caused by the title. According to *1969 Vienna Convention on the Law of the Treaties* the

---

<sup>100</sup> Tanakpur is located 6 km upstream from the Sarada barrage, at the exact point where the river enters the Indian Territory.

<sup>101</sup> Treaty between His Majesty's government of Nepal and the government of India concerning the integrated development of the Mahakali River including Sarada Barrage, Tanakpur Barrage, and Pancheshwar Project [online] Transboundary Freshwater Dispute Database. 2011-07-[accessed 30 July 2011],. available at URL:<<http://ocid.nacse.org/tfdd/>>

<sup>102</sup> Memorandum of Understanding on Tanakpur Barrage Project, 6 December 1991.

<sup>103</sup> *United Nations Treaty Collection*. [online] 2011-08-[accessed 30 July 2011],. available at URL:<<http://treaties.un.org/>>

<sup>104</sup> Salman, Salman M A, and Kishor Uprety. 1996. "Hydro-Politics in South Asia : A Comparative Analysis of the Mahakali and the Ganges Treaties." *Natural Resources Journal*.

title of the document does not affect the force of provisions stipulated therein. As the international treaty and according to Nepalese constitution the document has to pass through parliament. This was deemed impossible, due to the widespread anti-Indian sentiments in the society and among the representatives. Article 126 of Nepalese constitution demanding 2/3 majority for voting regarding natural resources, has worsened the situation:

approval of treaties or agreements on the following subjects be done by a majority of two-thirds of the members present at a joint sitting of both Houses of Parliament: (a) peace and friendship; (b) defence and strategic alliance; (c) boundaries of the Kingdom of Nepal; and (d) natural resources, and the distribution of their uses.

In parliamentary elections in 1994 the United Marxists-Leninist party won the poll rendering the country first communist-led monarchy on the continent. In late 1995, the Union Marxist Leninist government linked the Tanakpur issue into the complex package solution known as the Mahakali Treaty, which was approved by the parliament in 1996.

#### ***5.2.4.4 Criticism of the Kosi and Gandak Treaties***

There are mixed opinions about the equality of treaties. Some authors like Baillat emphasise pure imbalance in both cases while others like Elhance see them both as a win-win scenario.(Baillat, 2004; Elhance, 1999). Country relations evolve and actors learn and employ changing tactics. Baillat comparison between Lesotho Highland Water Project (LHWP)<sup>105</sup> Treaty<sup>106</sup> and The Kosi River and Gandak River Treaties seems implausible, because there was no India sponsored coup in Nepal before signing the treaties. There is a default imbalance in benefit sharing in favour of India, but this imbalance is proportionally equal to the relative powers of the participants. Nepal has several times successfully

---

<sup>105</sup> Treaty on the Lesotho Highlands Water Project 1986 [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL: <http://ocid.nacse.org/tfdd/tfddd docs/453ENG.pdf>

<sup>106</sup> Lesotho Highlands Water Project is a multi-billion water transfer and hydropower project implemented by governments of Lesotho and South Africa. The LHWP controversy lies in alleged South African involvement in *coup d'état* in which Major General Justin Lekhanya overthrew Leabua Jonathan on 20 January 1986. Shortly after this, on 24 October 1986, the Treaty on the Lesotho Highlands Water Project (LHWP) was signed. Unfair conditions for Lesotho alongside with unilateral benefits for South Africa fuel speculations about the possible South African involvement in the coup d'état. (Turton & Funke, 2008)

employed stall tactics bringing more just conditions regarding territorial issues. The untapped hydrological potential in Nepal remains substantial and the investment for the construction was in most cases reimbursed by the Indian side.

### 5.2.5 India and Bangladesh

The Ganges water dispute dates back to 1951. The independent state of Bangladesh had not existed yet; it was still part of Pakistan. India announced its plan to build a barrage at Farakka, 18 kilometres upstream from the East Pakistan.<sup>107</sup> Barrage<sup>108</sup> would divert the water in order to improve the navigability to the river port of Calcutta, which is located some 200 km from the seashore. Additional water from the Ganges transported by the 38 km-long artificial channel to the Bhagirathi-Hooghly channel would improve navigability in the dry season by flushing out the silt deposits. (Swain, 2004) The secondary reason was improving Calcutta's water supply quality, because greater inflow would lower the infiltration of municipal water sources by saltwater. Pakistani reaction was swift and diplomatic note was sent to India on 19 October 1951. There was not a single water-related institution working between India and Pakistan and both countries have had serious water problems in the Indus basin. The reply to the note labelled the plans as "purely hypothetical" and the preparations for the project continued unhindered. In 1957 Pakistan intended to submit the dispute to the United Nations, but India refused the submission, proposed the expert meetings instead, and commenced the construction in 1961. Meetings were held in Pakistan and India, but the pre-1965 war tensions meant a serious setback for relations between the two countries. In 1967 the Government of Pakistan brought the issue before 92 countries at the *International Water for Peace Conference* held in Washington.(Swain, 2004)

The 2,240-meter-long barrage was finished after the 1971 *Bangladeshi war of liberation* (Sisson & Rose, 1991) and the consecutive establishment of Bangladesh. It was finally put into operation on 21 April 1975. (M. A. Salman & Uprety, 1999)

---

<sup>107</sup> Punjab, North-West Frontier Province (Afghan Province), Kashmir, Sindh and Baluchistan (or Pakstan)

<sup>108</sup> Barrage is a special type of dam, which is mostly build for the diversion of water and is fitted with several gates for that purpose

India began the operation of The Ganges water diversion project in West Bengal to improve the navigation in the port of Calcutta and Hooghly channel by reducing sludge sedimentation and salinity. This diversion threatened historic riparian rights of Bangladesh. Eighty percent of Bangladesh's annual water budget depends on water flowing from India (Nishat & Faisal, 2000)

India built the barrage to get the flow diverted to the Hooghly channel lest the Ganges's flow should fall under 1133 m<sup>3</sup>/s (cubic meters per second). According to India's lowest possible scenario, the flow at Barakka at dry season should be between 1,557 m<sup>3</sup>/s – 1,416 m<sup>3</sup>/s leaving Bangladesh with the amount of 425 m<sup>3</sup>/s – 283 m<sup>3</sup>/s of water.

Bangladesh claimed that anything under 1416 m<sup>3</sup>/s in the dry season causes *appreciable harm* to its agriculture and other vital state interests. This would have left the Hooghly channel no water for operation, creating a zero sum situation for negotiation. Despite the apparently hopeless situation the temporary agreement was reached in the Joint River Commission after intensive negotiations. India agreed to keep the discharge between 312 m<sup>3</sup>/s – 453 m<sup>3</sup>/s and leave the rest to Bangladesh. This short term agreement was one of the reasons for discontent in the Bangladeshi army, which led to a coup d'état and killing of the Mujibur Rahman, who was assassinated with most of his family by a group of army officers. (Swain, 2004) The sensitivity of the issue could be explained by the severe 1974 famine, which was brought about by fatal flooding with the death toll of more than 450 000 victims (Alamgir, 1980).

The following stage of conflict was characterised by internationalisation of the dispute. According to wide accounts the Bangladeshi tried to bring the dispute before international forums including the United Nations General Assembly's 31<sup>st</sup> session (M. M. Rahaman, 2001; M. A. Salman & Uprety, 1999; Swain, 2004). Protests of India led to the withdrawal of the Bangladeshi proposal. It is highly likely that the firm anti-Indian stance of the new military regime in Bangladesh gave it the much needed credit on the national and international front.

Bangladesh also tried to improve its weak bargaining position through official protests at the Summit of Non-Aligned Movement and the Islamic Foreign Ministers Conference. After an unsuccessful attempt to change from bilateral to multilateral negotiations, Bangladesh

returned to bilateral talks with India and finally signed a water treaty in 1977. (Swain, 2004) Unfortunately this treaty failed to address the key biophysical stressor – seasonal fluctuation of flow. It was not planned as a long term solution. It failed to guarantee the minimal flow to Bangladesh. It was not meant to be a lasting solution and had to be renewed every 5 years.

The long term (30 years) institutional arrangement was signed in 1996<sup>109</sup> but the ability of the institution to perform under biophysical stress of seasonal fluctuation of flow is still questionable. The resilience of the institutional framework was tested in immediately after the signature. Political representatives of the countries used inflated water flow data to create an unrealistic water budget for the allocation in the treaty. The reason behind the data manipulation was to please the constituency and blanket the opposition.(McCaffrey, 2003b) The political crisis was quenched by an unexpected rainfall, bringing additional water in 1996.

### **5.3 Geopolitical Stressors**

Geopolitical stressors are not only disrupting the institutional equilibrium in the Ganges-Brahmaputra-Meghna watershed. If a long lasting geopolitical patterns and power relations are reflected and respected by the structure of water intuitions, the result could be stable and resilient. Group of authors from London school of Economics are offering valuable concepts of water and power relations in the watersheds. (Zeitoun, 2008)

#### **5.3.1 Disintegration of the British Empire**

One major geopolitical stressor is the disintegration of British Empire. In the aftermath of the British withdrawal in 1947, secular India and Islamic Pakistan started to exist. Geopolitical changes did not end with decolonisation. Secession of East Pakistan then becoming state of Bangladesh 1971 and the secession of Sikkim from Bhutan are examples of turbulent geopolitical stressors. Despite the intensity of impacts of geopolitical changes the institutional equilibrium was always re-established in the Ganges basin. The only

---

<sup>109</sup> *1996 treaty on Sharing of the Ganges Waters at Farakka*. [online] Transboundary Freshwater Dispute Database. 2011-07-[accessed 30 July 2011],. available at URL:<<http://ocid.nacse.org/tfdd/>>

condition was to cope with the change. Disintegration of British Empire as a supranational entity has led to disputes between India and Pakistan over Indus watershed (1947-1960). The disintegration of Pakistan did not let to disputes between India and Bangladesh (1974-1996), but changed the political rationale.

Lower intensity disputes became an integral part of the negotiation of the bilateral framework between India and Nepal on the tributaries of The Ganges-Brahmaputra-Meghna basin (1954-1996). These however, are not also connected to the aftermath of the British withdrawal, because Nepal and Bhutan were always independent states.

Relatively stable Indo-Pakistani water relations on the Indus are surprisingly resilient in comparison with very tense political relations between the bitter adversaries. On the other hand, good overall initial relations between India and Bangladesh have taken course for the worse after building the Farakka dam. Subsequent unstable rain patterns in the GBM watershed are a cause of severe floods and drought affecting millions, namely in Bangladesh, which ignites the tense relations between the neighbours.

### **5.3.2 Significant Power Asymmetry**

The main trait of the geopolitical setting in the basin is the dominance of India over its maller neighbours Bhutan, Bangladesh and Nepal. This is reflected by the hub and spoke like structure structure of relations between India and smaller states around Indian borders. Strictly bilateral “spokes”are attached to one only “hub” in the Delhi. It is important to note, that bilateral links between India and its neighbours sustain unresolved territory claims, sudden political shifts and political assassinations of Prime Ministers of India and Bangladesh.(Swain, 2004)

### **5.3.3 Critical Water Control Infrastructure out of National Borders**

The case of Farakka Barrage has been documented in great detail, but also India was concerned regarding installations on the Nepalese territory. India was anxious regarding the industrial and defence establishments, localized mainly in Uttar Pradesh, depending upon power generated in Nepalese territory(Baillat, 2004).

#### **5.3.4 Internal Political Instability**

There are examples of water card being played in the times political turmoil, like the Nepalese Royal Coup in 1960. *The relationships between India and Nepal became increasingly difficult as Nepal became more demanding. King Mahendra stated clearly his desire for “parity” in Nepal’s relation with India.* (Baillat, 2004)

#### **5.3.5 Nationalism and Religion**

In addition to the most apparent geopolitical stressors presented above, more subtle stressors are present in the Ganges-Brahmaputra-Meghna watershed. For example Indo-Nepal water relations have always been worse than relations between India and Bhutan. Explanation of the discrepancy might be in different perceptions of the national identity by Bhutan and Nepal. The Kingdom of Nepal is economically and politically dependent on India and shares the same Hindu culture. Nepalese perceive the dependence on India as a threat, because of their cultural similarity. They feel a constant urge for justification of their independent statehood. India was also involved in both Nepalese revolutions in 1951 and 1990. The question of Indo-Nepalese relations became a controversial topic after the democratisation process took hold in 1990s. In contrast isolated Bhutan is a Buddhist kingdom, which is unlike India in terms of religion and ethnicity. Bhutan does not have an urgent need to prove its national identity against their powerful neighbour. India is planning and financing water infrastructure in Bhutan and buys the electricity at advantageous rates, without making it difficult for Bhutanese government to justify the deals. In the years to come Bhutan can quickly outmatch Nepal’s hydroelectric capacity. (Baillat, 2004)

In 1975-76 combined geopolitical and biophysical stressors including drought, a military coup and the assassination of the Bangladeshi Prime Minister Mujibur Rahman, destroyed the positive momentum in mutual relations.

The religious value of the Ganges for Hindus in the GBM is not to be underestimated. The rise of Islamism in Bangladesh in 1980s enabled Indian dominant political party Baratia Janat Party (BJP) to project the conflict as a conflict between Muslims and Hindus over the

sacred River Ganges. (Swain, 2004) This interpretation could affect the negotiations despite being very questionable.

### 5.3.6 Unresolved Boundary Issues

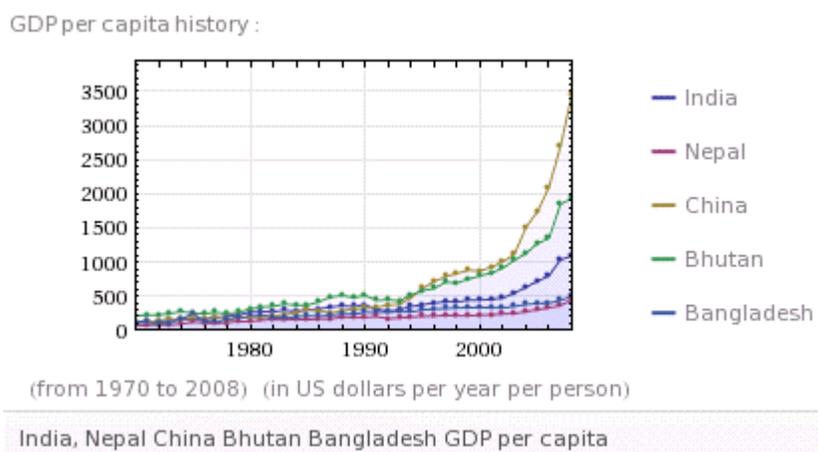
The border dispute between India and Nepal involves about 75 sq km of area in Kalapani, where China, India, and Nepal share borders. Unresolved border issues between China and India might be the major impediment to their possible future water cooperation. They will not be discussed in detail, because they lie in the Indus watershed. For the border issue enthusiast, there is a recent and comprehensive monograph book by Noorani (Noorani, 2011).

### 5.4 Socio-economical stressors

The whole watershed exhibits a huge contradiction between the potential and the realities of development. Despite their vast economic power and importance, India and China are still among lower middle income countries according to the OECD statistic. Bangladesh, Nepal and Bhutan are among the least developed countries. Despite the human potential, urge for development and abundant natural resources, the GMB basin remains home to the largest concentration of the poor in the world. (Ahmad et al., 2000)

The major socioeconomic changes are: rapid population growth, expansion of irrigated areas, urbanisation, deteriorating quality of surface water and ground water resources, rapid industrialisation and possible future increase of electricity demand.

**Picture 1: GDP per capita in Ganges-Brahmaputra-Meghna Basin**



### **5.4.1 Water Quality Issues**

Arsenic contamination of ground water was recognised as a human health issue in many parts of Bangladesh and in some parts of West Bengal in India (Biswas, 2008). The use of fertilizers, toxic pesticides and insecticides contributes to an increasing dependence of agriculture on such substances. Salinity intrusion is another major problem in the coastal areas. South-west Bangladesh is extensively affected by salinity as a result of the sharply reduced Ganges flows during the dry season. These problems may get worse with higher density of inhabitants per km<sup>3</sup>.

Excessive flooding in Bangladesh, which might be related to deforestation in India and Nepal, along with pollution and water shortages in the dry season, is forcing many Muslim Bangladeshis to migrate into predominately Hindu India and has caused localised violence and tension between the Indian and Bangladeshi governments in recent years. ???

Another possible future stressor is connected with India's plan to unilaterally build the *Mega River Linking Project* – a plan to link dozens of rivers throughout India by aqueducts and pumping stations to divert water from the Ganges River to the parts in the south and east of India, which are prone to water scarcity.

### **5.4.2 Hydropower Potential vs. Increased Demand for Electricity**

Electricity consumption in the region is extremely low on a per capita basis. The estimated per capita consumption of commercial energy is 197KgOE per capita<sup>110</sup> in Bangladesh, 476 kgOE per capita in India, and 320 KgOE per capita in Nepal. Average KgOE per capita of high income countries is 5,340 KgOE and the world average is 1,680 KgOE per capita. Installed capacity and actual power generation need to be increased so that the future demand can be met. (Ahmad et al., 2000) The GDP of India and its neighbours in the basin is rising which increases the likelihood of higher energy demand.

Inland navigation has an immense potential as a major mode of transport in the GBM region, particularly in India and Bangladesh, and also in Nepal. The Ganges, the

---

<sup>110</sup> KgOE is a unit of energy obtained from one kilogram of crude oil

Brahmaputra, and the Meghna, and their tributaries and distributaries create extensive inland water networks in the regional countries. These river courses have served as major arteries of trade and commerce and movement of people in these countries for centuries.

### **5.4.3 Neglected Water Needs of Tibet**

Absence of Sino-Indian water treaties is making the downstream riparian nations neglect the water needs of the Chinese provinces of Tibet and Xin Tiang. Gupta asserts the waters in Tibet could be diverted to meet the needs of northern China. If that does occur, this would lead to considerable tensions between the two countries. (Dellapenna & Gupta, 2009)

## **5.5 Biophysical Stressors**

### **5.5.1 Seasonal Variability of Flow**

The prime watershed stressor is a great seasonal variability in the total amount of rainfall and its spatial distribution within the basin. Three quarters of the yearly precipitation is concentrated in the three monsoon months – June, July and August. As a consequence, the basin suffers from severe droughts in the dry months and floods inundate large areas during the monsoon season. (Elhance, 1999) Bangladesh experiences yearly flooding on up to two-thirds of its territory during the monsoon season. (Wiebe, 2000) A secondary effect, the dry period flow of the Ganges increases salinity intrusion in Bangladesh. (Swain, 2004) Salinity intrusion has a detrimental effect on agricultural production which overlaps with the category of socioeconomic stressors.

### **5.5.2 Flood and Drought**

The monsoon runoff causes devastating floods and the dry-season flow is insufficient to meet the growing needs of this highly populated area. (Swain, 2004) Floods are causing losses and damage in the areas affected. The most recent examples are the 1998 flood in Bangladesh and the 2000 flood in West Bengal and Bihar in India. Wide spread damage and consequent economic setback affect people in particular. (Ahmad et al., 2000; Swain, 2004)

*President Ershad of Bangladesh, appealed for international assistance, but refused to accept any assistance from India, whom he did not hesitate to describe as the main culprit for the misery. The failure of the government machinery to cope with the disaster turned public*

*opinion against the government. So to save his regime from the public wrath, Ershad used the anti-India card vigorously. India got especially annoyed when Bangladesh returned the helicopters sent to help flood victims.* (Swain, 2004) This is an example of biophysical stressor transformation into the geopolitical stressor. Floods are extreme feature of biophysical sphere caused by precipitation, thawing of glaciers, climatic change, but not by the mankind. People are responsible for flood impact on the socioeconomic sphere. It is worthy of noting, that the anti-Indian sentiments in Bangladeshi society live their own live, regardless of the debate about Indian liability for 1988 floods.

The issues of another extreme event – drought – are similar. The dry season is lasts from January to May, with March-April being the most critical period. Bangladesh, as the last riparian to get the water, is the most vulnerable one to drought due to upstream abstractions. All 54 rivers shared by India and Bangladesh flow from the first to the latter.

### **5.5.3 Climate Change Effects**

The salient debate over climate is too over politicised. This thesis deos not need to consider the causes of the climate change. It only focuses on the effects areas endangered by climate change. In compliance with IPCC the anticipated changes include extremea variation of rainfall and increased sea level at the Bay of Bengal. This could result in longer lasting and more intensive flood and droughts. Infectious diseases and pests proliferate in polluted environments, which may be created by prolonged floods. In the winter drought reducing soil moisture could constrain crops and vegetation. The force feedback, between biophysical effects is often overlooked in the institutional arrangements.

## **5.6 Analysis of the Institutions in the Ganges-Brahmaputra-Meghna Basin**

The window of opportunity for establishment of the present water regime opened with the change of governments on both sides. The new Prime Minister of Bangladesh was Sheikh Hasina, who was a daughter of Mujibur Rehman killed in the coup of 1975 (see above). She was ready to compromise and Indian political scene was in turmoil after unsuccessful attempts to form a coalition. Indian chief negotiator was Joyti Basu from the Marxist

Communist Party of India.(Swain, 2004) Favourable political conditions led to conclusion of *1996 Farakka Barrage Treaty*<sup>111</sup>, which is one of three main pillars of the contemporary institutional framework in the basin. The other pillars are the *1996 Mahakali Treaty* between India and Nepal<sup>112</sup> and a set of treaties between India and Bhutan. On one hand The treaty complexes are not interconnected and can be examined discretely. On the other hand the watershed is hard wired by the hydrological circles and the transboundary impacts do not have to respect institutional constraints.

### **5.6.1 Bhutan and India**

The institutional framework between Bhutan and India seems to be very resilient. There are no major biophysical stressors and cooperation is profitable for both sides. Bhutan does not have the capacity and financial resources to build water infrastructure to utilise its immense hydroelectric potential and India is the only reasonable buyer for the produced electricity.

The treaty between India and Bhutan is a rare example of a successful international cooperation within the region. Biswas eloquently wrote: *viewed from any direction, the collaboration between the two countries has been mutually very beneficial, including enhancement of regional peace and stability.* His view of Indo-Bangladeshi cooperation on the Ganges is much more critical. He called it a missed opportunity. Alas, people find it sometimes hard to overcome not only the *narrow boundaries of geography but, what is worse, of the minds.* (Biswas, 2008)

### **5.6.2 Nepal and India**

Sarada (1920), Kosi (1954) and Gandak (1959) barrage Agreements between India and Nepal are the key sources of water conflicts and mistrust between the two upstream riparian of the basin (for details see Publication V). This acute mistrust even led Nepal to

---

<sup>111</sup> *Treaty Between the government of the Republic of India and the government of the People's Republic of Bangladesh on Sharing of the Ganga/The Ganges Waters at Farakka* [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL: <http://ocid.nacse.org/tfdd/tfdddocs/>

<sup>112</sup>

incorporate Article 126 (2) in its constitution in 1990, which requires that any “treaty” pertaining to natural resources and certain other matters be ratified by a two-thirds majority vote of the country’s parliament.(M. Rahaman, 2009)

There are no identity problems and a special treaty relationship with India helps to protect Bhutan against Chinese aggression. The Memorandum of Understanding was signed in September 2003 which regards the 870 MW Punatsangchu hydroelectric power project. (Baillat, 2004)

The history of their relationship was characterised by the Nepalese distrust towards India, which became an increasingly determining factor as the country democratised. The survival of many Nepalese governments was indeed directly linked to their policy choice towards India. Moreover, Article 126 of the Nepalese Constitution increased bargaining power by forcing India to make propositions acceptable for the two thirds of the Nepalese Parliament. (Baillat, 2004)

Relations between India and Nepal improved as evidenced by the Mahakali Agreement signed in February 1996. Treaty validates Sarada Treaty (1920), the Tanakpur Agreement (1991) and endorses the idea of Pancheswar Multipurpose Project. (Khalid, 2011)

The Mahakali River forms the boundary between the India and Nepal; the treaty gives the right to both countries to the equal entitlement of utilisation of the waters and specifies the implementation of the joint Pancheshwar Multipurpose Project. This relationship is different than the in case of Bhutan. Nepal is trying to be as independent as possible and seeks investors for hydroelectric project amongst international donors or private companies. For example Kali – Gandak power plant inaugurated in January 2004 is the largest hydroelectricity project in Nepal, and it was financed by the Nepalese government and Nepal Electric Authority with loans of the Asian Development Bank (ADB) and Japan Bank for International Cooperation (JBIC). (Baillat, 2004)

### 5.6.3 Bangladesh - India

In December 1996 another breakthrough agreement was signed between Bangladesh and India.<sup>113</sup> (Ahmad et al., 2000) The dispute over the Farakka barrage<sup>114</sup> had been deteriorating the relations between India and Bangladesh for many years before the agreement was signed in 1996.<sup>115</sup> This agreement valid for 30 years has been concluded after more than 20 years of negotiations resulting into provisional solutions because of seasonal fluctuation of water flow and climatic uncertainty. Both sides agreed to use overestimated water budget for the unrealistic 1996 Treaty allocation mechanism to make the treaty politically feasible. This did not pay off as the severe drought impacted Bangladesh and mass protest were pressing Bangladeshi government to find a solution. Bangladesh requested immediate consultation with India on emergency basis as permitted by Article 2 of the 1996 Treaty, but then unexpected rain eased the tensions. (McCaffrey, 2003b)

#### 5.6.3.1 Farakka barrage treaty

In 1996 *Farakka barrage treaty*<sup>116</sup>, both countries attempted to negotiate a settlement with respect to this river. But since the agreement does not cover the other riparians, its long-term effectiveness is unclear (Dellapenna & Gupta, 2009)

This structural disadvantage is not the only one. Careful examination of the *1996 Farakka barrage treaty* text discloses another challenge to the effectiveness of the treaty. The allocation mechanism described above is tied up to one exact point - Farakka barrage. The Ganges is only the only one of the 50 rivers flowing from India to Bangladesh. It is also the

---

<sup>113</sup> *Agreement on the cooperation for the sustainable development of the Mekong River Basin* [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL: <http://ocid.nacse.org/tfdd/tfdddocs/>

<sup>114</sup> A barrage dam is a special kind of dam which consists of a line of large gates that can be opened or closed to control the amount of water passing the dam. The gates are set between flanking piers which are responsible for supporting the water load. They are often used to control and stabilize water flow for irrigation systems.

<sup>115</sup> *Treaty Between the government of the Republic of India and the government of the People's Republic of Bangladesh on Sharing of the Ganga/The Ganges Waters at Farakka*. [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL: <http://ocid.nacse.org/tfdd/tfdddocs/>

<sup>116</sup> *Ibid.*

second most important tributary of the GBM river system, but nevertheless such a narrow treaty scope is another challenge to be reckoned with.

*Core provisions* are the rights and obligations aiming to achieve the purpose of the treaty, which is allocating water flow between India and Pakistan at Farakka. Article 1-3 along with the Annexure I. and II. *Farakka barrage treaty* aims to allocate water between signatories. The method of allocation is a combination of exact volumetric allocations and relative percentage shares according to the formula explicitly mentioned in Annexure I.

**Table 10: Ganges river allocations**

Availability at Farakka	Share of India	Share of Bangladesh
70,000 cusecs or less ( $<1982 \text{ m}^3/\text{s}$ )	50%	50%
70,000-75,000 cusecs ( $1982 \text{ m}^3/\text{s}-2124 \text{ m}^3/\text{s}$ )	Balance of flow	35,000 cusecs ( $991.10 \text{ m}^3/\text{s}$ )
75,000 cusecs or more ( $>2124 \text{ m}^3/\text{s}$ )	40,000 cusecs ( $1133 \text{ m}^3/\text{s}$ )	Balance of flow

**Subject to the condition that India and Bangladesh each shall receive guaranteed 35,000 cusecs of water in alternative three 10-day periods during the period March 1 to May 10** (Wolf & Delli Priscoli, 2009)

The core provisions of the treaty are supplemented with auxiliary provisions about Joint Water Commission (Article 4-7), emergency consultations (Article 9), other common rivers (Article 9), amendment mechanism (Article 10,11) and termination of the treaty (Article 12). Auxiliary provisions are increasing flexibility through a mandatory 5 year revision cycle (first revision possible in 2 years upon party request). Another flexibility promoting measure is an emergency governmental meeting mechanism in article 9, triggered by drought. Exact volumetric allocations are always rigid. Auxiliary provisions bring much needed flexibility at a cost, which is certainty and endurance of the legal framework.

*1996 Farakka barrage* has a rigid core which will be vulnerable to a number of stressors including: drought, flood, climate change effects, siltation etc. .

## **5.7 Partial Conclusions Ganges-Brahmaputra-Meghna**

Water rules and institutions in the Ganges-Brahmaputra-Meghna date back to 1900 BCE and water issues played significant role. Validity of Toynbee's model of challenge response could be tested of several examples including demise of the Harrapan civilization. The legal tradition Laws of Manu and Kautilya's Arathashastra was distorted by the British colonial rule. British model preferred laws safeguarding riparian rights of landowners to laws safeguarding public ownership of water sources.

Modern institutional framework developed in the 20th century and is based on three bilateral treaty complexes between India and its neighbours. The structure of the institutional framework is heavily influenced by power asymmetry. Contrary to most of the quantitative researches published in recent years plain amount of valid treaties or River basin organizations has a low predictability value, when the structure and content of the institutional framework is disregarded.

Two treaty complexes are linking 3 separate dyads of states in the GBM basin. Institutional framework could be likened to wheel and then India would be a hub and bilateral links would be a spokes. The "Dharma Chakra" wheel is also incidentally on the Indian flag.

### **5.7.1 Structural resilience**

Treaty network is incomplete and centralised. It is not resilient against any form of socioeconomic development in Tibet. Lack of multilateral arrangements makes the communication regarding water matters difficult between headwater states (Bhutan, Nepal, China) and downstream Bangladesh. Geopolitical changes in the basin, including decolonization, Indo-Pakistani and Sino-Indian wars, emergence of Pakistan, does not seem to have effect on the performance of the intuitional framework, once it is established.

### **5.7.2 Responsiveness to present stressors:**

Treaty instruments have specific water allocation mechanisms. Rigid water allocations have to be balanced by flexibility enhancing mechanisms like Joint commissions, limited treaty lifespan, mandatory renegotiation and conflict resolution mechanisms. Annual variability of flow is addressed in the treaties on the basis of 40 years of data collecting, and addresses the predictable seasonal changes. Extreme fluctuations are not addressed directly, but incorporated dispute resolutions mechanisms, should compel the signatories to negotiate peaceful settlement. In the aftermath of Gabčíkovo-Nagymaros Judgement it would be very difficult for a signatory state to terminate the treaty on the most common grounds defined by Vienna convention.

Treaty mechanisms are prone to biophysical stressors and socioeconomic stressors. Most salient biophysical and socioeconomic stressors are: Unsustainable pattern of population growth, growth of industrial demand for water and hydroelectricity. Identified changes will lead to the calls for readjustment of the current allocation schemes in the future. Another adverse effect is contesting of the validity of institutional registered in Nepalese stance towards ratification of the 1996 Mahakali Treaty.

Without comprehensive basin wide approach, it will be impossible to construct the technical capacities for sufficient water reserves. These capacities will have to be build on the territory of Nepal and Bhutan and cover the combined demand of both India and Bangladesh providing the Chinese demand will not increase. It is highly unlikely, that neglected Chinese riparian rights will remain neglected forever. Chinese investment in Tibet (Xizang autonomous region) suggest otherwise.

## 6 Mekong

The Mekong River Basin (MRB), the 21<sup>st</sup> largest river basin worldwide, is a transboundary watershed with a total area of 795 000 km<sup>2</sup>. The Mekong River flows from Qing Hai province in western China and through the provinces of Xizang (Tibet) and Yunnan. In southern Yunnan, it leaves China to form the border between Myanmar and Laos, crosses the territories of Thailand, Cambodia and Vietnam and finally discharges into South China Sea.

Table 11: Country areas of the Mekong River Basin<sup>117</sup>

	Area of country in basin (km <sup>2</sup> )	As % of total area of the basin	As % of total area of the country	Water contribution to the basin
<b>China</b>	165000	21%	2%	16%
<b>Myanmar</b>	24000	3%	4%	2%
<b>Laos</b>	202000	25%	85%	35%
<b>Thailand</b>	184000	23%	36%	18%
<b>Cambodia</b>	155000	20%	86%	18%
<b>Vietnam</b>	65000	8%	20%	11%

### 6.1 Cooperation in the Mekong sub-region

The institutional framework on the Mekong was formed through the second half of the 20<sup>th</sup> century and has gone through many changes. The last reorganization was started by the ending of the cold war.

---

<sup>117</sup> *AQUASTAT database* [online] Aquastat 2011- 07 [accessed 30 July 2011],. available at URL: <http://www.fao.org/nr/water/aquastat/main/index.stm>

### 6.1.1 Mekong River Committee

International cooperation in the Mekong River Basin has a long history under the Mekong River Committee (MC), the Interim Mekong Committee (IMC) and since 1995 the Mekong River Commission (MRC). *This is a history that has spawned the well-known “Mekong spirit.”* (Priscoli, 2001). The first period of the Mekong River Committee (1950s – 1975) was characterized by a significant US economic, and later military, presence in the region. The second period (1975 – 1995) was started by the spread of communist regimes in the region leading into a stall of the Interim Mekong Committee (IMC). Cambodia was not considered a fully independent country after the Vietnamese invasion in 1978 and thus the IMC had only three members. The institution withstood the geopolitical stress but no major mainstream project was feasible in the times of IMC.

Cooperation with Cambodia was possible again after the Paris peace accord in 1991. Despite of favourable conditions on both the regional and the international levels the negotiation process was far from simple. Thailand continued with the implementation of Khong-Chi-Mun project, in order *to direct water from the mainstream of the Mekong River into its underdeveloped Northeastern region* (Nakayama, 1995). Thus Thailand was reluctant to return to the 1975 Joint Declaration<sup>118</sup> as its *Article 20* demands “unanimous consent” of all members – practically a veto power – for any mainstream extra-basin diversion. Thailand did not want to submit its unilateral project for revision. The MRC Executive Agent, Chuck Lancaster, was advocating submission of the Khong-Chi-Mun irrigation scheme and Thailand declared him *persona non grata* (Makim & Gene, 2002). An UNDP career employee was recalled back to UNDP headquarters and the existence of the long standing cooperation on Lower Mekong was at risk. The Deputy Foreign Minister of Thailand said *if joining the committee means the loss of our sovereignty, we prefer to go it alone.*<sup>119</sup>

---

<sup>118</sup> Article 20, Joint Declaration of Principles 1975 [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL: <http://ocid.nacse.org/tfdd/tfdddocs/374ENG.pdf>

<sup>119</sup> Kanwerayotin, S. (1992): The Mekong - More of a liability than an asset?, Bangkok Post, 21 March 1992

The UNDP mobilized its powers to bring the countries to negotiations. Some cooperation mechanisms had to be removed to reach a compromise. “Veto power” was neutralized by Thailand’s unwavering stance and the former position of the Executive Agent was redefined as a position called CEO albeit with fewer powers. Finally Cambodia was readmitted to the Mekong River Commission and the *Agreement on cooperation* was signed in 1995.<sup>120</sup>

### **6.1.2 Mekong River Commission**

The period from 1995 onward is characterized by a plurality of overlapping institutions, the increasing role of China in regional politics and rapid economic development and implementation of water development plans. Beside the most prominent Mekong River Commission and its predecessors Mekong Committee and Interim Mekong Committee which have existed through the whole second half of 20<sup>th</sup> century and is an outstanding example of institutional resilience, there are at least two other regional institutions that are gaining momentum.

### **6.1.3 The Greater Mekong Sub-region**

The Greater Mekong Sub-region (GMS) program of the Asian Development Bank (ADB) began operation in 1992. GMS has the clear advantage of having all six Mekong countries as members and recently moved to implementation of water infrastructure projects like the 1,070 MW Nam Theung 2 dam in Laos.

### **6.1.4 The Quadripartite Economic Cooperation**

The Quadripartite Economic Cooperation (QEC) is an initiative of China, Thailand, Laos and Myanmar. QEC is proceeding with the blasting of rapids on the Mekong to improve the Mekong’s navigability. This will allow 100 ton ships to navigate from Thai sea-ports to the Chinese province of Yunnan. Free navigation is stipulated in 2000 Lancang-Mekong Navigation Agreement. China is the main benefactor of this agreement but blasting of the rapids may have a negative environmental impact on both Vietnam and Cambodia.

---

<sup>120</sup> Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin (1995) [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL: <http://ocid.nacse.org/tfdd/tfdddcs/546ENG.pdf>

Establishment of the QEC and especially the signing of the Lancang-Mekong Navigation Agreement has been a wasted opportunity for the MRC to attract China, which is still very reluctant to enter to MRC. Navigation could have been a part of larger “basket of benefits”, that would have brought China into a basin-wide cooperative framework. Yunnan province of PR China does not benefit from foreign investments like coastal provinces, but if Yunnan goods could reach Thai ports, it would be a large boost for Yunnan’s economy.

China’s ambition is to get access to the sea for goods from Yunnan and to continue with unrestricted dam construction on the Upper Mekong. QEC is a good platform to achieve this goals and the Commercial Navigation agreement from 2002 signed by China, Myanmar, Laos and Thailand is very profitable for China.

The absence of China renders the Mekong River Commission vulnerable to biophysical and socio-economic stress as it cannot estimate the amount and quality of water in the Mekong due to the development of Chinese hydroelectric and water infrastructure projects in Yunnan. China plans to build seven cascade hydropower dams in the Upper Mekong Basin. Manwan dam was officially completed in 1996 but its reservoir was filled earlier in the 1992-1993 dry season. Construction of the second dam Dachaoshan dam was completed in December 2002 (Khanh, 2003). Construction on the third dam, Xiaowan Dam, began in 2001 and is expected to be completed by 2013 (Richardson, 2002). Hydropower development in Yunnan Province in the PRC is likely to have a great impact on hydrology of the Mekong Basin - with a potential installed capacity of 15,600 MW and an active storage of 23,200 mil. m<sup>3</sup> by 2025 (Cumulative report Nam Theung).

Laos also has plans for development in the hydropower sector that are likely to have significant downstream impacts. However, Laos will have to consult its schemes for development with the MRC. Consultation with downstream riparian nations can improve the systems resilience against biophysical and socioeconomic stress and keep the Mekong development sustainable. It is absolutely vital to bring China into the broader institutional framework. It could be done in various ways. Cooperation between Mekong River Commission and Greater Mekong Sub-region seems to be very promising and is likely an effective way to improve the resilience of Mekong institutional framework.

## **6.2 Biophysical stressors**

The Thai-Khong-Chi-Mun diversion plan and similar activities held the potential for worsening environmental problems already present in the highly productive Mekong delta (Kamkongsak & Law, 2001). Around 25% of the Mekong's flow feeds Vietnam's Mekong delta and 1.6 million hectares of the delta suffers from salt-water intrusion from the South China Sea (Makim & Gene, 2002). Geologic surveys have confirmed the presence of large areas of underground salt deposits in many provinces in the northeastern region. Two million hectares in the Korat plateau are influenced by underlying geologic salt deposits (Hiebert, 1991). Additional stressors include seasonal fluctuation of flow and floods, change of ecosystems impacting local populations like fishermen on Tonle Sap in Cambodia, etc.

## **6.3 Geopolitical stressors**

Among the main geopolitical stressors in the Mekong basin we find significant power asymmetry between states on different levels; lack of interest on the Chinese side in entering a broader cooperation framework. Thailand and Cambodia dispute on sections of their boundaries because of missing boundary markers; Cambodia claims Thai encroachments into Cambodian territory and obstructing access to Preah Vihear temple ruins (Shaw, 2008); environmentalists in Myanmar and Thailand remain concerned about China's construction of hydroelectric dams upstream on the Salween River in Yunnan Province.

## **6.4 Socio-economical stressors**

Uneven distribution of wealth in the watershed is not necessary disrupting the peace in the region. According to Swain, the GDP of Thailand alone had a 10 times higher (nominal) GDP than Cambodia, Vietnam and Laos combined (Swain, 2004). This was remarkable fact in the year 2004. What is remarkable now is a change of the GDP of Vietnam, Cambodia and Laos. The hypothesis that liberalization of economy leads to higher nominal GDP is probably true, but that is not concern of this inquiry, because the magnitude of the change *per se* is a potential threat to Mekong water institutions. Up till now China's growth was not considered in the debate. Considering the GDP alone for the period 2000 - 2010 China's grew around staggering 10 percent a year.

Uneven economic development created a gap between Thailand and the post communist lower Mekong riparian countries. Thailand was able to find financing for the Kong-Chi-Mun Project from regional sources through the ADB and consequently lost some of its incentives for cooperation with other lower Mekong countries as stipulated in the Joint Declaration of Principles (1975), *Articles 10 and 20*.

## **6.5 Partial conclusions**

The Mekong River Basin is a good case of complex relations between states and rivalry among water institutions (Ratner, 2003). The Mekong has six riparian states grouped into three different water institutions or programs including the Mekong River Commission, Greater Mekong Sub-region and Quadripartite Economic Cooperation. MRC includes four lower Mekong countries and QEC includes four upper Mekong countries, while Thailand and Laos are members of all three organizations at the same time. All six riparians are members of GMS. The Mekong River Commission has the longest history of cooperation and has the support of various international organizations including UNDP, but has failed to attract China and Myanmar as members. The greater Mekong Sub-region program founded by ADB has the advantage of all six riparians being members allowing it to proceed with the implementation of large scale water infrastructures such as the Nam Theung 2 hydroelectric project in Laos. China is the greatest supporter of QEC and of the Agreement on Commercial Navigation on Lancang-Mekong River. This treaty was signed to improve navigability of the Mekong and to allow Chinese ships to reach sea-ports in Thailand. Rapids and shoals were blasted to remove obstacles for the large ships. This has not been good news for the Mekong River Commission which could have used navigability of the Mekong to improve its bargaining position in negotiating Chinese participation in its structures.

Are the relations on Mekong truly complex or just complicated? The answer lies in the emergence of the number of rival institutions in the region. Emergent structures may rise from the watershed as a result of the patterns of relationships between the agents. Water institutions are always a result of interactions between riparian states. *System is complex in the sense that a great many independent agents are interacting with each other in a great many ways* (Mitchell Waldrop, 1992).

It was not intended or planned to have overlapping institutions on the Mekong. They emerged from negotiations between states and they are not an outcome of rational planning. If it were otherwise, we would probably not have an incoherent institutional framework with several rival institutions.

## 7 Aral Sea Basin

### 7.1 Watershed geography and climate

The disappearing Aral Sea, till 1960 the 4<sup>th</sup> largest body of water in the world, is fed primarily by two rivers: the Amu Darya and the Syr Darya. The Aral Sea basin is shared by the five post-Soviet countries of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan and three other countries: China, Afghanistan and Iran.

Since 1960 maritime conditions around Aral Sea have been replaced by more continental and desertic regimes. Summers have warmed and winters cooled, spring frosts are occurring later than previously and fall frosts earlier, humidity is lower and the growing season shorter. Precipitation is low, except in the mountain belt of the south-east, from which come most of the surface water inflows, mostly in the two large rivers, the Amu Darya and the Syr Darya. The total discharge volume of these is about 120 km<sup>3</sup> per year. (Létolle & Chesterikoff, 1999; Micklin, 2010)

Table 12: Country areas in the Aral Sea Basin<sup>121</sup>

State	km <sup>2</sup>	% of basin area	% of country area
South-Kazakhstan	540 000	28%	20%
Turkmenistan	466 600	24%	96%
Uzbekistan	447 400	23%	100%
North-Afghanistan	234 800	12%	36%
Tajikistan	141 670	7%	99%
Kyrgyz Republic	117 500	6%	59%
<b>Total</b>	<b>1 947 970</b>	<b>100%</b>	

---

<sup>121</sup> Aquastat database [online] Auastat 2011-06 [accessed on 08 August 2011] available online at URL: <http://www.fao.org/nr/water/aquastat/main/index.stm>

## **7.2 Development of the Aral basin Institutional framework:**

The need to integrate water resources management was recognized before the internalization of the Aral Sea Basin. In the climate of the Perestroika proposal for an institutional framework, approved in 1986, two River Basin Organizations were created: RBO “Amu-Darya” with headquarter in Urgench, and BWO “Syr-Darya” in Tashkent (Dukhovny & Sokolov, 2003). In the period of independence the Interstate Commission for Water Coordination (ICWC) was founded in accordance with the “Agreement on collaboration in the sphere of joint water resources management within interstate water sources” approved in 1993. Later in 1993, two new organizations were established. The Interstate Council for the Aral Sea (ICAS), set up for program coordination; and the International Fund for Saving the Aral Sea (IFAS), which had the purpose of raising and controlling funds. Later these two bodies were merged into the new IFAS. This institutional framework comprises post-soviet republics. Other riparian states such as China are connected to the framework via a bilateral treaty.

The institutional framework of the Aral can be divided into two groups. The first group subsumes soft law basin-wide water institutions incorporated into a multilateral declaration and joint institutions as the 1992 Agreement on Cooperation and Interstate Commission on Water Coordination (ICWC), which was later integrated with International Fund for the Aral Sea (IFAS) in 1997. This soft law institutional arrangement has two purposes:

1. Coordinate the state’s water policies
2. Create a platform for distribution of funds contributed by international donors (World Bank, GEF, European Union, UNDP, UNESCO, USAID, SIDA etc.)

The first group of institutions may be resilient to potential geopolitical stress to a certain degree as its primary purpose is likely fundraising from the international donor community. This matter will need a further detailed survey.

The second group consists of more specific “hard law” instruments like the 1997 Treaty on *Use of the Syr Darya Water Resources* and the 1996 Treaty on the *Use of Water and Energy Resources of the Syr Darya River basin*. These treaties were aimed at finding the solution to

the water issue and energy sharing in the Syr Darya River basin. *Nevertheless, like in previous cases, the two treaties failed by and large because of the non-compliance problem* (Shalpykova, 2002).

### **7.3 Toktogul dispute**

The impact of concurrent stressors on the politics of riparian countries in an internationalized river basin can be illustrated by a dispute between Kyrgyzstan and downstream riparian countries. Toktogul dam reservoir and its 1200 MW hydropower plant were built in the former the Soviet Republic. Kyrgyz SSR was entitled to a free supply of fossil fuels principally from Uzbekistan, in exchange for timely water releases according to the agricultural needs of its downstream neighbours. This barter trade however ended with the breakup of the USSR. Uzbekistan began asking for market prices for its fossil fuels and demanded that the water releases remain at the same rate in summer for the sake of its cotton fields. Kyrgyzstan was releasing water in winter to produce electricity for heating and reciprocally asked downstream states to contribute to the operation and maintenance of the Toktogul water infrastructure. Kyrgyzstan estimated costs as high as USD 25 million a year (McCaffrey, 2003b; Sievers, 2002).

### **7.4 Biophysical stressors**

This transboundary basin is very often taken as an example of environmental degradation and it is abundant with examples of biophysical stressors. Decrease of flow and subsequent soil degradation.

#### **7.4.1 Salinization due to intensive irrigation**

The Aral Sea basin is located in the Aral–Caspian depression, which is a zone of intensive salt exchange due to arid climate, hydrological and geomorphological peculiarities formed under conditions of natural artesian water. (Dukhovny, Umarov, Yakubov, & Madramootoo, 2007) Aral Sea area is probably the most well known case of salinization due to the Soviet-era irrigation schemes for immense cotton industries from the 1960s (Dukhovny & Sokolov, 2005). There are about 5.35 million ha of irrigated land. It is irrigated with a combination of

surface drainage, and vertical and horizontal subsurface drainage. Most of these irrigated lands became saline or approached salinization. (Dukhovny et al., 2007).

Salty dust which is raised by the wind settles on vegetation and crops, particularly in the Amu Darya delta. Sometimes the plants are killed outright; in some cases their growth and yields is reduced (Micklin, 2010). Airborne salt and dust is contributing factor to high levels of respiratory illnesses and impairments, eye problems and throat and cancer in the near Aral Sea region. Dust and salt blowing from the dried bottom of Aral sea, and also from irrigated farmland, is laced with pesticides and heavy metals, which enhance the negative impacts on humans (Micklin, 2010)

#### **7.4.2 Pollution**

Chemical, nuclear (Carius, Feil, & Switzer, 2003) and biological weapon (Brashko, 2002) pollution is disturbing the fragile ecosystem resilience of the region.

Contaminants dissolved in the Syr-daria and Amu-daria are accumulating in the Aral sea.

The present day uranium concentrations in Aral Sea water mainly originate from the Syrdarya River due to uranium mining and tailings in the watershed. From the ecotoxicological point of view, an increase in the Syrdarya River discharge as the major water source will be crucial for the water quality of the Small Aral, despite its high uranium load. However, as it is intended to restore fishery in the Small Aral, accumulation of uranium in fish has to be monitored (Friedrich, 2009).

#### **7.4.3 Climate Change**

Uncertainties of climate change led to the world's most persistent and severe drought in Central and Southeast Asia. The drought has had devastating socioeconomic and environmental consequences and has been exacerbated by the rapid disappearance of glaciers in the Pamir Mountains. Glaciers feeding the flow of the Amu-Darya have been reduced by 40 % in recent decades (de Schutter & Dukhovny, 2003). Climatologists predict that rapid melting of the Pamir's glaciers will increase flow of the Amu-Darya in winter and reduce flow in summer. Such flow reallocation will have a severe impact on the availability

of water for irrigation (Dukhovny, 2002). It is not an overstatement to say that the *whole region is an environmental disaster* (Sievers, 2002).

## **7.5 Geopolitical stressors**

The largest geopolitical change in the recent history of the Central Asia region was the disintegration of the Soviet Union, which it created a huge stress on the institutional framework of the Aral Sea basin. In the Soviet Union every important decision had been made by the water ministry - Minvudkhoz. This method of authoritative resources management is primarily responsible for the present biophysical and socioeconomic stressors. Central Asia has always been located between world powers which has resulted in political fragmentation and ethnic diversity. Central Asia is not clearly dominated by any of the world power. Russia, Turkey, Iran, China, Pakistan, India and the United States all have strategic interests in this region. Central Asia may become geopolitically unstable, which might deteriorate the relations between riparian and disrupt the water cooperation framework.

## **7.6 Socioeconomic stressors**

An important, but sometimes overlooked stress factor is the delayed development of post-Taliban Afghanistan, which stood apart from the building of joint water institutions in the 1990s. Future Afghan water needs were not accounted for by existing institutions and a substantial increase in water usage is expected due to increased economic development.

## **7.7 Partial conclusions**

Despite the fact the Aral Sea basin is a very volatile region; its framework does not seem to be significantly affected by geopolitical stress - however that does not mean that it is resilient to it either. Review of riparian countries attitudes on transboundary water issues can be accessed from their adherence to international law. They accede to various conventions on environmental protection (Sievers, 2002) just for the sake of acceding, avoiding the implications of such treaties. Reform of state policies and adoption of sustainable water use patterns will be necessary to confront the enormous biophysical stressors in Central Asia.

It may seem from the first glimpse of this situation that the dispute is caused by geopolitical stress (disintegration of the USSR), but this stress occurred after the introduction of a free market to the region. The disappearance of central authority may be stressful to the water institutions in the basin, but the actual exchange of benefits was going on, until it was halted by Uzbekistan's demand of full price reimbursement for fossil fuel for water swap.

Aral Sea basin is special on the number of stressors and their force feedback relations.

Socioeconomic and biophysical stressors in the Aral Sea basin are intertwined and create an amplifying feedback loop. It is impossible to deal with them without a coordinated approach. Significant (though varying in extent) decreases in GDP per capita in all riparian countries have led to a sharp reduction in subsidies and support of agriculture and the water sector. (Dukhovny & Sokolov, 2003) Estimated costs of nation-wide installation of a highly effective drip irrigation system in Uzbekistan are USD \$100 billion. (Sievers, 2002).Uzbekistan is the second largest cotton exporter and its agricultural sector creates 38% of the nation's GDP. A significant factor affecting the regional water sector is the sharp fall of world prices for cotton (from \$1,760 to \$800 per tonne). The introduction of market mechanisms in agriculture, and privatization have caused the breakup of large state and collective farms into hundreds and thousands of small farms. This change was not combined with the establishment of effective infrastructures and institutions for water distribution and allocation.(Dukhovny & Sokolov, 2003)

## **8 Euphrates-Tigris**

*Food is the matter; water is the matter*

*(Sumerian Proverb)*

Euphrates and Tigris watershed was chosen because of its turbulent past and eventful present. This watershed clearly demonstrates the phase transition of human society called Neolithic revolution. From that moment system of rules pertaining to water distribution in space evolved and adapted to biophysical, socioeconomic and geopolitical changes. Following chapter does not aim to be complete list of relevant changes and only nonlinear and interesting changes and adaptations were selected at author's discretion.

### **8.1 Watershed geography and climate**

The Euphrates and Tigris river systems are considered as one basin because they join near Qurna (Iraq) in a combined flow called Shatt Al-Arab shortly before emptying into the Persian Gulf. Both rivers are also connected through the construction of several canals. The Euphrates–Tigris River Basin is a transboundary basin with a total area of 879 790 km<sup>2</sup>. Euphrates (2800 km long) and Tigris (1950 km long) rise in the mountains of eastern Turkey, have their sources within 80 km of each other in eastern Turkey, and their headwater area is mostly in present day Turkey (22%). The Euphrates–Tigris River Basin is further distributed between Iraq (46 %), Iran (19%), Syria (11%), Saudi Arabia (1.9%) and Jordan (0.03 percent). (Aysegul Kibaroglu, 2002)

Geography and law delineate the watershed area by common terminus, which is after confluence of Euphrates and Tigris a new river called Shatt-al-Arab. This geographical fact was craftily used by the Turks in contemporary negotiations over waters of Euphrates. Bilen writes that “It is misleading to focus on the River Euphrates or the River Tigris in isolation one from the other. These two rivers form one single basin having an annual potential of 87.2 BCM and should be taken as part of the same system. (Flint, 2004)

The amount of water carried by Euphrates to confluence at Shatt-al Arab is around 32 BCM. The discharge varies between 14,9 BCM– 56,4 BCM. The head water area in eastern Turkey,

contribute 98 per cent of water. It has a relatively high precipitation around 1000 mm a year. Tigris originate at the same mountains, then forms a border between Turkey and Syria and Iraqi Syrian border and then turn to Iraq towards its meeting with Euphrates. The hydrological parameters are approximately equal to Euphrates with 31 BCM and the amplitude span between 17 – 59 BCM. (Lupu, 2001) The main difference between two rivers is, that Tigris does not get most of its water from Turkey. The ratio between the water contributions of and is 42 per cent Turkey, 43 per cent Iraq and 9 per cent Iran. (Dellapenna, 1996)

**Table 13: Country areas in the Euphrates-Tigris River Basin<sup>122</sup>**

<b>Countries included</b>	<b>Area of country in basin (km<sup>2</sup>)</b>	<b>As % of total area of the basin</b>	<b>As % of total are of the country</b>
<b>Iraq</b>	407 880	46,4	93,1
<b>Turkey</b>	192 190	21,8	24,5
<b>Iran</b>	166 240	18,9	9,5
<b>Syria</b>	96 420	11	52,1
<b>Saudi Arabia</b>	16 840	1,9	0,8
<b>Jordan</b>	220	0,03	0,2
<b>TOTAL</b>	879 790	100	

Jordan and Saudi Arabia are riparian only to the Euphrates. Iran is riparian only to the Tigris. Geological and climatic development of the basin prepared the stage for the first Agricultural revolution as one of the most important, if not the most important revolution

---

<sup>122</sup> Aquastat database [online] Auastat 2011-06 [accessed on 08 August 2011] available online at URL: <http://www.fao.org/nr/water/aquastat/main/index.stm>

in human history. So called Neolithic caused a debate among historians and archaeologist, who argued about the causes of this long term, nontrivial and multi-stage process.

## **8.2 Evolution of institutional framework**

This section deals with legal instruments regulating the water resources allocation, protection and maintenance of the water infrastructure form the times of ancient civilisations of Mesopotamia, through the Islamic water law to the present international system. The purpose of this chapter is to describe the beginnings and evolution of the regulatory framework we have today in almost 5000 years span. It is important inquire, whether and how the self-regulating water law system(D'Amato, 2005) evolves over time.

### **8.2.1 Excursion to the Law of ancient civilisations in Mesopotamia**

About 6,000–7,000 years ago, the hunter-gatherers slowly changed their way of life under altering environmental conditions and settled down. In this Neolithic revolution people sacrificed the mobility for the richer food sources, which allowed greater concentration of people living together sedentarily. Then the farming villages of the Near East and Middle East became urban centres. These centres have become city states of the Sumerian civilization around 3000 BCE. Civilization was dependent on water on agriculture and transport. The ancient Mesopotamian valley lacked good drainage and experienced many floods. For agriculture based society irrigation was a permanent concern. a complex system of canals, reservoirs, dykes, etc. was developed in order to ensure appropriate water supply to the fields. (Mays eds., 2010)

The need of water appeared when the development in irrigation increased demand for limited resource. According to Kornfield, there have been a tradition or custom of following precedents handed down by learned or well-respected colleagues, that is, a type of *stare decisis*. (Dellapenna & Gupta, 2009). Principle of *stare decisis* is for the most part principle of municipal law and according Shaw this principle or precedent, maintained by the British courts and ensures that the judgments of the higher courts are binding upon the lower courts of the hierarchical system. (Shaw, 2008) We take this as an evidence of emergent properties of even the eldest systems of law. As mention in *Chapter 3* the purpose of legal system is to give authoritative outputs on the legality or illegality of claims from the real

world. Once the claim is tagged as legal, the systems memory should not let the same claim tagged as illegal, unless there is a strong reason for change. Hence the system rule of *stare decisis* keeps the system predictable to the recipients of the decisions and internally coherent.

Mesopotamian society was based on tradition, custom and respect to the deeds and decisions of the ancestors. Kornefield emphasises the path from regimen to custom and then path from once successful custom to the establishment of the moral standards and traditions governing all aspects of day to day life of Mesopotamian people. (Dellapenna & Gupta, 2009) Water law is a branch of legal system, which stems from the general morality and tradition of the region.

Regardless of the aforementioned categorization, Mesopotamian law was merely a collection of assorted decisions. Our knowledge of the legal system of Mesopotamia is limited to archaeological evidence. The containers for assorted collections of decisions were inscribed stone monuments *stele*, which used to stand on convenient places for the people to consult them. The rest of archaeological evidence in form of contract, letters and judicial records is in form of sealed clay envelopes. In order to confirm the exact wording of the legal document, one had to shatter the envelope. This had an advantage of protecting the text from alteration or damage. It suggests that most of the individual obligations were adhered to because of general acceptance of the religious origin of the law. The wrath of Maduk – god of law was sufficient coercive method.

Water was a communal asset or more precisely the irrigation water was a communal asset administered by a local authority. The reason for that was simple, individual was not able to upkeep sludges, irrigation channels, barges and other essential water infrastructure.

One of the eldest written rules addressing water laws can be found in Code of Ur Numma more than 4000 years ago. Only 37 laws and the partial prologue preserved today and one of them addresses water law: '[i]f a man floods (/) another man's field he shall measure and deliver 720 silas of grain per 100 sars of field. (Dellapenna & Gupta, 2009) The simplicity of the reciprocal rule and the exactness of compensation is astonishing. We can see carved on a stone "stele" the predecessor of *neminem ledere* one of the oldest principles of law. If we translate this principle into the modern international water law, it would be most certainly

*no harm rule*. The advantage of this particular rule is in immediate remedy. Grain was at the time suitable mean of payment for flooded fields.

First water law, first water, and first “international” water treaty emerged in the region between Euphrates and Tigris. Even though the modern system of international law is not older, than 400 years, Shaw brings an example of proto international treaty, between dated 2200 BCE (Shaw, 2008). The treaty dealt with boundaries on rivers and artificial canals between the two city states - Umma and Lagash. The war that started between the Umma and Lagash 2500 BCE is deemed by some experts to be the only water war in human history. (Wolf & Delli Priscoli, 2009)

### **8.2.2 Introduction to Islamic Law**

The Euphrates and Tigris watershed is shared predominantly by Islamic riparian countries. The religion and society are inseparable in these countries and religion system and legal system are not fully separated as expected in the western world. The religion in general always incorporates set of rule concerning the most important facets of human life together with water usage for religious and other purposes.

The term for Islamic legal system - Sharia has several meanings. According to Bernard Weiss it means in archaic Arabic *the path to the water hole*. The evolution of the term is obvious as water had crucial role in sedentary and nomadic population of Arabian, before the life Prophet Mohammed and its role did not substantially diminish in the passing centuries. *In many parts of Arabia, towns and villages sprang up around wells and oases.*(Hallaq, 2005). Likening of legal system to a path is one of the few things Sharia has in common with public international law. The other similarity is in the behaviour of the legal system. Sharia and PIL are both processing the information from outside the system and evaluating received information against the sources of law to give an authoritative output: this deed is according to the law and on the right path and the other deed is illegal and of the right path. The analogy and reasoning are recognized form for evaluating the deeds with the Shariatic records. The output is not limited to a statement defining whether judged behavior was on the path or an off the right path. Sharia gives trespassing subjects very earthly punishment along with the heavenly retribution.

The second meaning is usually connected with the following Qur'anic verse: We then appointed you to establish the correct laws; you shall follow this, and do not follow the wishes of those who do not know. (Al Qur'an, 45:18). It could be deduced that God is the source of law and prophet has a duty to obey the law and establish it within society and that a Muslim is not allowed to change the law or choose another legal system. On one hand it is very hard to adapt the God-given legal framework under the changing circumstances and on the other hand Islamic water law is not very rigid in the rights and obligations it imposes on Muslims regarding water. Sharia is not only the law of Muslims, it is also the law of God and nature, and therefore breaking the law is at the same time an insult to God, nature and human nature and thus crime and sin are becoming one.

### **8.2.3 The sources of Sharia**

Sharia is not a national law in the western sense, but it is not international law either. It should regulate the entire community of believers (*Umma*). Only some of the sources of Sharia are undisputedly accepted by entirety of all Muslims. Among those are the holy book of Qur'an and *sunna*. Part of the *sunna* are traditions authenticated sayings, deeds and habits of the prophet Muhammad called *hadith*. Each *hadith* has two parts: description of the event connected with prophet or his family and a chain of traditions confirming the truthfulness and validity of the event. For example:

The Holy Prophet said; "Guard against three practices which invite people's curses evacuating one's bowels near water sources, by the roadside and in the shade." (Faruqi, Biswas, & Bino, 2001)

The chain (*silsila*) of people who gained and passed the knowledge of prophet's words could look like this: *Ali abu Talib said that A'isha said that the Prophet Muhammad said....* The purpose of the *silsila* is to give authority and verify the rule embedded in *hadith*.

Naff counted, that Qur'an is full of references to water (*ma*:63 occurrences), river (*nahr/anhar*:54 occurrences) and drinking water (*shariba*: 39 occurrences), but the rules imposed by the holy book are very far from being specific and helpful in deciding conflicts over shared water sources between Muslim countries. The general concepts of stewardship

of nature including water resources and emphasis on compassion to other human being, animals are beautifully mirrored in following Quar'anic verses:

He who withholds water in order to deny the use of pasture, God withholds from him His mercy on the Day of Resurrection, [and] Excess in the use of water is forbidden, even if you have the resources of a whole river, [and] The surplus of a well must not be withheld. (Quran, Sura 21:30, Sura 22:50, and Sura 25:48–49)

Secondary source of Islamic law are also local 'good' local customs, which were later islamicized. The primary and secondary sources of Islamic water law have to be enriched by two accepted intellectual tools: *ijma* and *quijas*. *Ijma* is consensus of scholars and *quijas* is an analogy. Both tools are used in fiqh – the Islamic jurisprudence.

#### **8.2.4 Sharia and ownership of water**

Primary sources of *Sharia* distinguish in the first place between water which is owned and water which is not owned. Secondary categorization make a distinction between quality of water fit for different purposes.<sup>123</sup> *Hadith* recorded by many (Dellapenna & Gupta, 2009; Faruqui et al., 2001) records a declaration attributed to prophet himself: '*...Muslims [humankind] are co-owners in three things: water, fire, and pasture.*' The *Sharia* has a specific term for public property or public goods in strict economic sense, it is *mubah*. The primary question of this sub-section is whether water is a *mubah*?

If the water was only treated as public good or *mubah*, the whole Muslim society (*umma*) would have an unrestricted right to use it, and every member would have a duty of stewardship towards all the living things. Nevertheless there are situations, when water is treated as undisputed property of an individual owner. In general terms all the water, which was obtained or extracted with work, infrastructure or knowhow can be deemed as private ownership of the 'investor'. This is applied without any further questions to water in any form of container, be it a PET bottle, Bedouin water skin or modern swimming pool.

---

<sup>123</sup>Water is water is categorized according to source (river, is river, well, spring water, rain, snow, and hail). It is further divided by use: pure (*taher*) for both religious and mundane purposes, clean (*tahur*) for drinking, cooking, irrigation, etc., and polluted (*mutanajjis*) which is unfit for either religious or mundane activities. (Dellapenna & Gupta, 2009)

Interesting question of dams, but watersources in rivers are usually in the hands of the state, which is perceived as *umma* by *sharia*, the owner would not differ. No evidence was found to support private ownership of water in privately build reservoir on public land. The owner would have been granted a right to exclusive use but there will be certain obligation to non-users in stressful situation.<sup>124</sup>

In between the private contained water and public property of the whole community lies another category of water belonging to a privately owned land. Farouki confirm, that owner of a land had a priority of use of water belonging to his land. He had certain duties to other people and other living thing imbued in his role of steward to god given water. (Faruqui et al., 2001).

A different environmentally influenced but very simplistic rule could be found in article from Dellapena and Naff. They assert the rule prioritizing upstream users to downstream users, which makes a lot of sense in arid environment. Evaporation could be huge factor in the Middle East and North African countries. (Naff & Dellapenna, 2002). There is a maxim limiting prioritized use mentioned by hadith ankles

According to Naff, until the twentieth century, under both the Western and Islamic systems of jurisprudence, water laws largely delineated the relationship of individuals to the resource, treating the two as integral. As modernization altered the basic structures and institutions of society, in non-Muslim polities, terms such as 'use-rights' as opposed to 'ownership' increasingly became the legal concept preferred among codifiers of Western water law.(Dellapenna & Gupta, 2009)

### **8.2.5 Relationship between Sharia and system of international law**

Islamic water law or *sharia* is a legal system which is not international nor purely national. It which is highly adapted to its environment. It is likely to be successfully applicable in arid lands of Middle East and North Africa (MENA). Other large Muslim countries like Indonesia might not benefit so easily from the values embedded in *shariatic* water law. Most of the

---

<sup>124</sup> One has a right to trespass on private land to satisfy thirst if his life or health is in danger. No one has a right to withhold excess water. (Faruqui et al., 2001) p. 29

rules are very ambiguous in the meaning of creative ambiguity, which might be helpful for overcoming obstacles. From comparison of present state of International law of water resources and Islamic can be seen interesting co evolution of the same basic principles.

Equity and justice are paramount in *sharia* and many traces of rules aiming to fulfil the ideal of a reasonable and equitable utilization could be found. One of the first *califs* Othman was instructed by prophet to buy a well at Ruma and give away it's water for free. The apparent strife to achieve social justice.

**No harm rule** which later crystallize in the international community has it`s predecessors in *sharia*.

**Benefit sharing** could be perceived as the latest trend in the water management, but connection between *sharia* rules governing the appropriation of water and appropriation of land, are firm foundations of today`s benefit sharing. According to Naff appropriation and use must derive from an input of labour, e.g., building an irrigation canal. Only the fruit of such labour counts in matters of ownership and gain. It is the irrigation channel itself and the irrigated field and its crop that may be owned in inalienable right (*mulk*) by virtue of the labour that created them, not the water that flows through the one into the other. Water is the product of God's creation and belongs to Him, not to humankind, and therefore can be used only transitorily in accordance with *sharia* and 'urf. (Dellapenna & Gupta, 2009)

### **8.2.6 Colonial Agreements on Euphrates and Tigris**

Historically, Iraq has been the major user of Euphrates and Tigris water from the times of ancient civilisation mentioned in the previous section. Successive empires ruled the area since 6000 BCE and their water issues are described in detail in the dedicated chapters above. Four modern states Turkey, Syria, Iran, Iraq founded on dissimilar but equally nationalistic principles, are sharing the river now.<sup>125</sup> The relations between *three riparians during the period between 1920 and 1960 can be characterized as harmonious*(A. Kibaroglu

---

<sup>125</sup> There are in fact 6 riparian countries, but Iran does not rely too much on Euphrates and Tigris water and Saudi Arabia and Jordan have a negligible part of the watershed

& Ünver, 2000) In 1921 France<sup>126</sup> and Turkey signed an agreement allowing the Syrian city of Aleppo to construct a water-supply system on the Euphrates (Lupu, 2001). This was about to end, as some project, that would later bring the countries on the brink of war were discussed as early as 1936.<sup>127</sup> Colonial agreements are summed up in following table:

**Table 14: Colonial agreements on Euphrates and Tigris<sup>128</sup>**

Year	Agreement	Main aspects
1921	Agreement between France and Turkey with a view to promoting peace, signed in Ankara on 20 October 1921	According to Article XII of this agreement on “Distribution and Removal of Waters” it was agreed that the waters of Kuveik shall be shared between the city of Aleppo and the district to the north remaining in Turkey, to satisfy the two parties.
1923	Lausanne Peace Treaty	Article 109 of the Lausanne Peace Treaty states that, unless otherwise agreed, if due to tracing of a new border, the river system of a state is dependent on the facilities within the borders of another state or hydropower is utilized within the borders of a state that was established before the war, an agreement must be reached among the parties which is capable of safeguarding interests and the sovereign rights of each of them . . .
1926	French-Turkish Convention of 1926	1926 treaty decreed that water disputes would be resolved on the basis of complete equality.
1929	The Protocol signed between France and Turkey on June 29, 1929 for the protection of	Article XIII of the Convention of Friendship and Good-Neighbourly Relations between France and Turkey, May 1926

---

<sup>126</sup> French mandate over what is now Syria,

<sup>127</sup> Turkey established Electric Affairs Survey Administration, which considered Keban dam project in 1936 (Kolars, 1994)

<sup>128</sup> The Transboundary Freshwater Dispute Database [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL: <http://www.transboundarywaters.orst.edu/database/interfreshtreatdata.html>

Aquastat database [online] Auastat 2011-06 [accessed on 08 August 2011] available online at URL: <http://www.fao.org/nr/water/aquastat/main/index.stm>

	present rights together with irrigation.	makes references to the water issue.
1930	The Final Demarcation Protocol of the Commission on the Demarcation of the Turco- Syrian Border. Igned between Iraq (under British mandate) and Turkey May 1930.	which both sides promised not to change the flow of the Euphrates without the other's consent.

### 8.2.7 Modern water disputes

The post war epoch started with an important treaty signed between now Independent Iraq and Turkey. *1946 Treaty of Friendship and Neighbourly Relations between Turkey and Iraq* reaffirmed principle, stating that Turkey would consult Iraq before it constructed any waterworks project and would strive to satisfy Iraq's needs as far as possible. (Lupu, 2001)

This treaty may be a very important document in the future determination, whether Turkey is or is not persistent objector. So far Turkey is one of countries, which have consequently turned down any proposal hindering her full sovereignty over her water sources. In this treaty in a protocol No. 1 Turkey has agreed to following:

*Article 5* Turkey shall keep Iraq informed of her plans for the construction of conservation works on either of two rivers or their tributaries, in order that these works may as far as possible, be adapted, by common agreement, to the interests of both Iraq and Turkey

Article 5 is constituting *opinion juris* in accepting principle of using reasonable and equitable share of transboundary water source. Presumably the 1930 protocol determining boundaries could provide *usus longaevus necessitates* ending Turkish efforts to become persistent objector. With a more thorough study of *Article 3* author of this thesis assumes, that prior notification would also apply for Turkey, despites her latter strong denouncement of that possibility. The treaty also authorized Iraq to build waterworks inside Turkey to regulate the rivers and avoid flooding in *Article 2,3 and 4*. Relations deteriorated between the three states in the following decades. The projects contemplated in the 1946 treaty were never built, possibly because Iraq was reluctant to have facilities so

key to its survival located outside its borders. Although the *treaty is technically still in force, it has apparently fallen into disuse. (Dellapenna 1996)*

Even though Keban Dam was planned earlier, the golden age of the large water infrastructure projects began in 1960 and not only in the middle east, but throughout the entire developing world. The most studied examples from Euphrates-Tigris are South-eastern Anatolia Project (Turkish acronym GAP) of Turkey, and the and the Tabqa dam and irrigation project.<sup>129</sup> The overture to the latter serious disputes was the filling of the Keban dam. The dam had a positive impact on the water storage capacities of downstream riparians and decreased the yearly variation of flow by 70 percent. This uncertainty was welcomed, but Iraq and Syria insisted the flow of Euphrates would not fall under  $350 \text{ m}^3\text{s}^{-1}$ . According to Turkish delegation this was impossible to maintain in the time of filling the dam. Meetings continued with the involvement of United States Agency for International Development (USAID) and the World Bank, which was an investor on the Karakaya Dams further downstream. Donors pressed on Turkey to give guaranties to downstream riparians. Lupus asserts that Turkey developed a negative stance towards the possibility of third-party mediation, or third-party intervention as consequence of WB and USAID involvement.(Lupu, 2001) this could be imprecise. Discrepancies between countries promises to donors before the financing and their behaviour afterwards are common. Central Asia is a suitable example as described in chapter nine.

Turkish promise was probably promising the impossible. Meetings continued in the beginning of the 70s and Joint Technical Commission was established. Despite the entire intuitional safeguard no agreement was reached. Turkey started impounding the Keban reservoir by 1974. At the same time that Syria had almost finalized the construction of Tabqa dam. As no agreement was concluded the region was on the way to a real water conflict.

---

<sup>129</sup> Euphrates Valley Project

### **8.2.8 Tabqa Dam dispute**

Tabqa Dam was a typical project build in the 1970s. Hafez al Assad let Tabqa dam and a lake bearing his name built to boost overall development of Syria in 1973. Lake Assad is capable storing 12 BCM of water and irrigate 640,000 hectares (Dellapenna, 1996) Large dams cause large problems and Tabqa was not an exception. Problems with seepage causing channels to collapse, high levels of gypsum and soil salinization due to the over pumping diminished the planned irrigated area from 640,000 hectares to 400,000 hectares. Another problem was significant evaporation in the lake Assad built in the middle of the desert reaching 630 MCM a year.

After the dam was completed in 1973, Iraq claimed a threat to its national security, and both states moved troops to their shared border. (El-Fadel, El Sayegh, Ibrahim, Jamali, & El-Fadl, 2002; Lupu, 2001) While Lake Assad was being filled, Iraq's Euphrates flow was reduced by sixty-seven percent. Yearly water flow dwindled from 29 to 21 BCM (El-Fadel et al., 2002).

Two countries impounding two large dams in combination with substantial drought left a very little water for Iraq. Chain reaction started with Iraq, blaming Syria and Syria blaming Turkey and ended up with amassment of Iraqi forces on the Syrian border. This incident has been widely cited (Daoudy, 2009; Flint, 2004; Kucukmehmetoglu & Guldman, 2010; Lupu, 2001).

Following Soviet and Saudi mediation, the states pulled their troops back, with Syria agreeing to leave 60 per cent of Euphrates water for Iraq. (Dellapenna, 1996) The relations between Iraq and Syria deteriorated, after this incident, but there were more general political considerations in play and also the historic background of Iraq Iran war. After the war in 1989, when the relations were re-established a minor adjustments were made to the water division scheme.

### **8.2.9 South Eastern Anatolia project**

Turkey designed South Eastern Anatolia project (Güneydoğu Anadolu Projesi, GAP) to alleviate the poverty stricken region of South Eastern Anatolia. Massive project consisting 22 dams and 19 hydraulic power plants and irrigation 1,700,000 hectares of irrigated land

claims to be completely based on principle of sustainable development. This seems to be difficult to accomplish if a sheer size and anticipated transboundary impacts.

GAP Project was scheduled for completion in 2010, but the deadline has been pushed to 2047 because of financial constraints. So far, a total of 272,972 hectares are under irrigation, and 111,500 ha are under preparation. (Daoudy, 2009) Full implementation of the GAP will ultimately withdraw a maximum of 70% of the Euphrates natural flow, about 40–50% of its observed flow, and 50% of the Tigris River. (Daoudy, 2009; Kolars, 1994) This would not be compatible with the water budgets of Syria and Iraq. Once in history the rivers run dry. It was

First transboundary impact of GAP under construction was decrease of Tabqa (lake Assad) due to filling of one of the dams. According Lupu this was settled 1987 The protocol however was not published and according to Lupu guarantee inflow from Turkey to Syria at least 500 cubic meters per second (15 MCM per year). (Lupu, 2001) Possible reason for secrecy was alleged promise from Syria to curb Kurdish separatist activities in Syria. Several hostile acts were committed by both signatories. Turkey accused Syria not suppressing the Kurdish insurgents on its territory and threatened to stop the water flow in reprisal. Turkey was Syria allegedly shot down a Turkish survey plane within Turkey's borders in response to threats.

An interesting twist to the dispute was the filling of the Attaturk Dam. Turkey stops the water flow of Euphrates completely for one month causing a severe water crisis in Syria. Turkish explanation was, that additional  $250 \text{ m}^3\text{s}^{-1}$  were sent down the riverbed in two preceding months making up for the one cut of flow.

The dispute over transboundary impact is far from being over and despite the prolonged construction due to the financial constraints Turkey is determined to improve Southern Anatolia with its multistage multi billion dollars project. Please find the satellite imagery on the Ataturk dam in the appendixes to imagine the size of the GAP project. Data for water losses due to evaporation are alarming. Total evaporation of Turkey's dams is between 1,5 to 2 BCM. The total available water resource in Turkey according to Keban is around 31 BCM (Bagis, 1997). The same author challenges the idea that Turkish is water rich and the

downstream users are water poor in the following table, which is compared with FAO data for the current year showing remarkable differences:

### 8.3 Contemporary Institutional Capacities of Euphrates and Tigris basin

Prevailing argument of this thesis is, that treaties are not equal, their internal wiring and stricter do matter in mitigating water conflicts. First step is to strip the framework only to valid and relevant agreements. There is total of 9 treaties in the Euphrates and Tigris (Shatt-al-Arab) basin. Table: all IWT:

**Table 15: Treaties in Euphrates and Tigris basin<sup>130</sup>**

Year	Treaty	Signatories
1921	Agreement between France and Turkey with a view to promoting peace, signed in Ankara on 20 October 1921	France, Turkey
1923	Lausanne Peace Treaty	
1926	French-Turkish Convention of 1926	France, Turkey
1929	The Protocol signed between France and Turkey on June 29, 1929 for the protection of present rights together with irrigation.	France, Turket
1930	The Final Demarcation Protocol of the Commission on the Demarcation of the Turco- Syrian Border. Igned between Iraq (under British mandate) and Turkey May 1930.	Turkey, Syria
1946	Treaty of friendship and neighbourly relations, and six annexed protocols, signed at Ankara	Iraq, Turkey
1955	Treaty between Turkey and Iran on the Sarisu and Karasu River	Iran,

<sup>130</sup> The Transboundary Freshwater Dispute Database [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL:

<http://www.transboundarywaters.orst.edu/database/interfreshwaterdata.html>

Aquastat database [online] Auastat 2011-06 [accessed on 08 August 2011] available online at URL:

<http://www.fao.org/nr/water/aquastat/main/index.stm>

		Turkey
1975	Treaty concerning the state frontier and neighbourly relations between Iran and Iraq and protocol	Iran, Iraq
1975	Agreement between Iran and Iraq concerning the use of frontier watercourses, and protocol	Turkey , Syria
1987	Protocol on matters pertaining to economic cooperation between Arab Republic of Syria and Republic of Turkey	Turkey , Syria
1990	Law No.14 of 1990, ratifying the Joint Minutes concerning the provisional division of the waters of the Euphrates River	Syria, Iraq
1998	Minutes between Syria and Turkey on cooperation in fighting terrorism, signed at Adana, including Annex 2	Turkey , Syria
2001	Joint communique between Republic of Turkey Prime Ministry Southeastern Anatolia Project Regional Development Administration (GAP) and Arab Republic of Syria Ministry of Irrigation General Organization for Land Development (GOLD)	Turkey , Syria

Under closer scrutiny most of the agreement does not add up to the relevant regional mechanisms. It is promising that in 2001 Syria and Turkey signed a joint communiqué, but there is no water regime established by the treaty. It is however promising, that problem of scarce and non reliable data is addressed through some of the agreements. There are only two formal agreements from which riparian rights and obligations could be derived.

First is the *Protocol on matters pertaining to economic cooperation between Arab Republic of Syria and Republic of Turkey*, signed in Damascus on 17 July 1987, which has an important water allocation provision:

Water

6. During the filling up period of the Ataturk Dam reservoir and until the final allocation of the waters of Euphrates among the three riparian countries, the Turkish Side undertakes to release a yearly average of more than 500 m<sup>3</sup>s<sup>-1</sup>. five hundred cubic meter per second at the Turkish-Syrian

borders and in cases where the monthly flow falls below the level of 500 m<sup>3</sup>s<sup>-1</sup>, five hundred cubic meter per second, the Turkish Side agrees to make up the difference during the following month.

Second is the 1990 Joint Minutes concerning the provisional division of the waters of the Euphrates River establishing effective, but rigid water allocation scheme between Iraq and Syria. Since there is guarantee from Turkey to deliver at least five hundred cubic meter per second at the Turkish-Syrian borders water regime for two countries is established

Taking note of all these, the Two Parties Iraq and Syria waiting for reaching the trilateral agreement with Turkey agreed in the following:

1. The Iraq water share on the border region between Iraq and Syria is 58% as a fixed annual total percentage (water year) of the water of Euphrates River allowed to pass in Syria through the border with Turkey, and the Syrian share of water is the remainder quantity 42% of the water of Euphrates River allowed to pass through the border between Turkey and Syria.

Both arrangements were meant to be only temporary. Syria and Iraq perceived that the impounding of the Ataturk reservoir constituted a tampering of the flow of the Euphrates and would serve as the beginning of many such interruptions. (A. Kibaroglu & Ünver, 2000)

There several ad-hoc commissions, like a Joint technical committee, between Turkey although there is no permanent River Basin organization, but there is no permanent River basin organization.

No similar agreement has been reached regarding the Tigris; Turkey claims a right to use those waters as it wishes.

### **8.3.1 Biophysical stressors**

The storage facilities which Turkey has built within the GAP region serve to regulate river flow which usually varies at extreme rates due to seasonal and annual variations in precipitation patterns (Kolars, 1994)

The fragile arrangement based on volumetric allocations anchored at two border points could be easily disrupted by drought It has happened in 1975. (A. Kibaroglu & Ünver, 2000; Kolars, 1994) Other authors mentioned severe drought spanning from 1999 to 2001 (A. Kibaroglu & Ünver, 2000)

### **8.3.1.1 Salinity intrusion**

The water salinity of the Euphrates River as it enters Iraq, has more than doubled compared to that of 1973. The salinity has increased gradually over the last 30 years. Water quality of the Euphrates within Iraq has deteriorated due to the decreased flow that is entering Iraq, diverted flows to the river from Al Thar-thar Lake, and irrigation-return flow. The decreased flow from upstream sources was due to reservoir construction projects. (Rahi & Halihan, 2009)

A recent drought has once again brought this issue to the forefront of discussion between the three countries: Syria and Iraq have demanded that Turkey release more water, while Turkey maintains it does not even have enough for its own purposes.<sup>131</sup>

### **8.3.2 Socioeconomic stressors**

The World Bank estimates that the total populations of these countries will grow from 96 million in 1995 to 138 million in 2010. This alone will not put much stress on the fragile institutional framework. The problem lies in the uneven distribution of population growth. Turkey has population growth 1,2 percent a year, Iraq 2,3 percent and Syria staggering 3,7 percent per year. This makes Syria the fifth fastest growing countries in the world.<sup>132</sup>

#### **8.3.2.1 International sanction regime**

Sanctions can be a tangible obstacle to socioeconomic development as well as impediment to international cooperation. *Twenty years of international sanctions imposed on Iraq and, to a lesser extent, Syria, have prevented the establishment of durable economic, political, and social relationships between Turkey, Syria, and Iraq.* (Kucukmehmetoglu & Guldman, 2010)

---

<sup>131</sup> Water Levels in Turkish Dams Drop, TURKISH DAILY NEWS, Feb. 5, 2001; Chris Morris, Turkish Drought Worsens Regional Water Row: Iraq and Syria Say New Dams Threaten Supply, THE GUARDIAN, Oct. 2, 2000; Syria Upset at Turkish Decision to Cut Back Water Flow, DEUTSCHE PRESSE-AGENTUR, Sep. 28, 2000; Syria Struggles with Dwindling Water Supply and Drought, CNN, Oct. 18, 1999, at <http://www.cnn.com/WORLD/meast/9910/18/syria.water/index.html> (last visited Oct. 26, 2001).

<sup>132</sup> United Nations, Department of Economic and Social Affairs, Population Division (2009) [online] UNdata – a world of Information 2011-08 [accessed 6 August 2011], available online at URL: <<http://data.un.org>>

### ***8.3.2.2 Unilateral projects for development of underdeveloped regions***

The very recent unveiling at the end of May 2008 by the Turkish government of a \$12 billion (bn) investment package for the South-eastern Anatolian provinces reveal renewed priorities placed on the expansion of water and socio-economic infrastructures in the region that is the heart of Kurdish activism. (Daoudy, 2009)

### **8.3.3 Geopolitical stressors**

Power asymmetry Iraq has more potential control over the Tigris than the Euphrates because Iraq controls much of the water flowing into the Tigris. (Lupu, 2001)

#### ***8.3.3.1 Political and Military Alliances dividing the basin***

The three countries have experienced various alliances in the past and the mutual mistrust is considerable. In the cold war period Syria was loosely aligned with Soviet Union and Turkey was dependable member of North Atlantic Alliance (NATO). Iraq and Iran has been engaged in a long and bloody war with a casualties exceeding 1,5 million of death and wounded.(Rajae, 1993)

Membership in the International organizations shows a remarkable difference between Turkey and the rest of the riparian countries. Turkey is not part of the Organization of Oil Exporting Countries (OPEC) nor League of Arab Nations. Both countries have been actively seeking support from the Arab League by demanding that Turkey consult with them over water rights. On the other hand Turkey is a member of the Council of Europe and the European Bank for Reconstruction and Development (EBRD)

Turkey and Syria sided with the allied forces against Iraq during the Persian Gulf War in the early 1990s. Turkish-Israeli strategic military and commercial alliance has been an obstacle for developing relations between Turkey and League of Arab Nations members Syria and Iraq.

#### ***8.3.3.2 Power asymmetry***

Turkey has several advantages over its neighbours including hydro-strategic position and status of a regional power. Daudy confirms that Turkish power was also a constructive force in turning possible disputes into cooperation. Syria shared common interests with

Iraq and therefore two countries created a bloc to counter Turkish position. The Iraq war along with successful water for security agreement between Turkey and Syria caused, that Syria abandoned coalition with unstable Iraq and sided with powerful Turkey. (Daoudy, 2009)

### ***8.3.3.3 Stabilization and Development of Iraq***

Stabilization of Iraq may result more water demands, and since Turkey is implementing Ilisu Dam on Tigris, which is due to be completed in 2011, there is a chance, that these two combined factors may bring more water related tensions. The Ilisu Dam will decrease the flow of Tigris by 47 percent per year and cut off as much as 50 percent of water flow to the city of Mosul in summer months. (Daoudy, 2009)

### ***8.3.3.4 Irredentist movements***

Kurdish leader Abudllah Ocalan was residing in Damascus. Syria promised to stop supporting the Kurds. Turkey threatened Syria with military action if Syria continued to shelter Kurdish rebels. Syria later expelled Ocalan, who was later captured by Turkey, and the two states signed a security agreement<sup>133</sup> with Syria agreeing to stop supporting the Kurds. Turkey has linked the security issues to water by manoeuvring Syria to stop supporting the Kurdistan Workers' Party (PKK) in exchange for guaranteed water flow to Syria.

## **8.4 Discussion and partial conclusions**

The process of evolution of water related rules in Fertile Crescent and in Mesopotamia in particular took almost 6000 year to settle down. The water laws of Manu, Hammurabi, Summers Hittite, Assyrians and Babylonians show remarkable resemblance. The system of irrigation channels, that was vital for agricultural production and lasted for thousands of years was developed and maintained through simple rules. These rules were based on the principles, which are very similar to the principles customary international water law.

---

<sup>133</sup> Treaty of Adana on Cooperation over Security 1998 [online] Oregon State University 2011-06 [accessed on 08 August 2011] available online at URL: <http://ocid.nacse.org/tfdd/tfddd docs/596ENG.pdf>

Another similarity is adherence to *stare decisis* and adjudication being rare and last resort in case of water dispute. This suggest following assumptions:

Principles of contemporary water law are not a modern artificial constructs, but ancient principles evolving from the dawn of mankind. The similarity does not end there. Water conflicts were leading to first institutional arrangements between the ancient states and within their socio-political fabric. Water technology and infrastructure were drivers of development of more advanced institutional mechanisms since, because they required more advanced division of responsibility between the members of society.

Islamic water law confirms these findings, as it was allowing the customs of pre-Islamic times to enter the canon of Shariatic water law. No harm rule and benefit sharing were integral part of the system.

Modern international water law and institutional is also exhibiting properties of a system, that emerged out of relations between sovereign actors. Water is used to gain political leverage in the region, which is an impediment to more holistic cooperation schemes. Turkey linking ousting of PKK from Syria is preeminent example of such practices. The statistical analysis of the institutional frame work does not prove useful. Author found out, that there are much more legal documents, than was estimated before, but also that the normative content of the documents is very low. The permanent water commissions are not playing important part in the basins water politics. The framework is anchored to two agreements that were thought to be provisional at the time of signature. One is guaranteeing specific amount of water on the Euphrates and one is dividing the water between Syria and Iraq. The major stressors, such as uneven regional development, unilateral development projects, and seasonal water flow variations are not addressed by the institutional framework.

The gaps are structural and content related. Structure does not include all the resources (Tigris is not included) and all the important riparian countries (Iran). This may decrease water availability in unstable Iraqi region around Shatt-al-Arab. This is still considered an unresolved territorial issue. The regional politics is divided into several economic and military alliances, which are going across the watershed making the cooperation more difficult. Nevertheless the latest regional water related events suggest, the modest

improvement in relations between the three most important riparians. According to (Daoudy 2009) the Iraqi Water Resources Minister visited Syria and Turkey to meet about the resumption of trilateral talks and agree on flow increases from upstream sources into the both rivers at 2008.

Do zaveru

## 9 Conclusions

### 9.1 Discussion on general rules of international water law

The sources of the public international legal system lack the hierarchical structure of domestic legal systems. The adaptation of water rules within the international law system, with a special regard to salient role of international custom, was described in this thesis. According to the historical analysis of the absolute territorial integrity principles are recently being abandoned in favour of principles of limited territorial sovereignty. Shift from Harmon doctrine to reasonable and equitable use is the vital strategy. Changes in general rules of international water law were first recognized on milestones of codification process including 1966 Helsinki rules, 2004 Berlin rules and still not ratified 1997 *Convention on the Law of Non-Navigational Uses of International Watercourses*. Then the actual international treaties were examined for references to presumed principles of international water law. The dataset of 74 internationally confirmed water related treaties are based on following principles which gain acceptance as customary rules of international law:

1. Principle of equitable and reasonable utilization
2. “No significant harm” rule
3. Principle of prior notification
4. Principle of sustainable use of international water sources

The number of provisions directly invoking these principles has risen greatly in the last years. The salient role of international water custom was strengthened even more by the Judgement in Gabčíkov-Nagyamaros dam dispute.

The judgment has important consequences for the law of international watercourses and for the emerging international environmental law. In the decision on this case, the ICJ accepted that there is an existing principle of “ecological necessity” whereby a state may be absolved of responsibility for an otherwise wrongful act, in this case, the breach of a treaty, by invoking the Law of the State Responsibility on the grounds of an environmental

degradation threatening an “essential interest” of the state, even though Hungary was not in the state of “ecological necessity”. This state can only be said to exist when there is a real, grave and imminent peril at the time it is invoked, thereby refuting that Hungary’s more long-term concerns for its wetlands and biodiversity constituted an essential interest. (Shaw, 2008) Regarding Czechoslovakia’s (after 1992, Slovakia) unilateral diversion on the decision of the Court, reflected in the first place, that *pacta sunt servanda*. In the second place the Court reaffirmed principles laid out in the *1997 Convention on the Law of Non-Navigational Uses of International Watercourses*, in decreeing that Czechoslovakia had deprived Hungary of its right to an *equitable and reasonable share* of the Danube. It reaffirmed the principle of the “community of interest” in shared watercourses.

## **9.2 Lessons learned from the case studies**

### **9.2.1 The Danube Case study**

Establishment of *The European Commission of the Danube River* was an apparent breakthrough to the so far uninterrupted sovereignty of nations. Once the international organisations acquired their share of sovereignty, they started to safeguard their existence. The main goal was to keep the newly internationalised river open for ships of all countries, but Danube water institutions were also used to influence regional management. Non-riparian countries of France and Great Britain used it to stabilise the Danube watershed and oust Russia out of the Danube delta after The Crimean War. The USSR returned them the favour back in 1948 expelling non-riparian countries and reinforcing their rule over the watershed. The 1948 Danube Commission de-internationalised the river and made the navigation exclusive to riparian countries. The socialist planning and Soviet approach to natural resources allowed environmentally unsound project like Gabčíkovo-Nagymaros dam which has caused problems, when the Soviet rule disappeared. It led to Gabčíkovo-Nagymaros dispute, which changed the global water rules profoundly.

The Danube water has changed the focus of cooperation substantially. In the first stage (1616-1948) the focus was predominantly on navigation. In the second stage (1948-1989) navigation was still the main issue, but the brotherly relations and cooperation of COMECON countries was reaffirmed by several controversial infrastructure projects. One of

them – Gabčíkovo-Nagymaros system of locks had detrimental effects on environment, but beneficial effects on a dissent movement in Hungary. A mixture of environmental, political and nationalistic reasons led Hungary and Slovakia into the dispute. Gabčíkovo-Nagymaros was the most important water dispute addressed by the International Court of Justice. 1997 Judgement of International Court of Justice reaffirmed that principle of *equitable and reasonable utilisation* along with the principle of *no appreciable harm* as the customary rules of international law.

The Danube watershed has a structure of interconnected network. The European Union is an important actor of the water cooperation. It has become a member of the ICPRD and the Danube Commission 2000. After the two enlargements of the European Union in 2004 and 2007, the Danube region will be strongly influenced by coordinated European policies. It is apparent, that *acquis communautaire* will be shaping the policies of the Danube countries. The framework water directive is already changing municipal and international mechanism towards integrated trans-boundary watershed management. The Danube is one of the European TEN-T<sup>134</sup> water corridors and its protected areas are under Natura 2000. The Danube illustrates how a river basin organisation can provide a basis for negotiations on broadening needs. It has shown how the broader forces of regional integration can encourage cooperation along the river through the building of a robust institutional framework.

Water institutions are deemed important or even indispensable in the European context after 1856. In the turbulent times of both world wars and after the collapse of the Iron Curtain, the Danube commission was always perceived as an asset and thus rather dominated, than dismantled. This could also signify that countries do not see the river basin organisations as politically biased.

The institutional framework changed and adapted to political realities, and work differently under different dominant powers, but it was always transformed and never disbanded. The rapid response to the change of cooperation focus from navigation to the environmental

---

<sup>134</sup> The Trans-European Transport Network Executive Agency

protection is a remarkable example of the high institutional capacity and adaption. The contemporary stressors in the basin are mostly environmental and both international (ICPRD, Danube commission) and European (Framework Water Directive) are addressing the salient environmental challenges. The main advantage however is the unique linkage, between regional cooperation and domestic legal system of riparian countries on Danube existing through indirect applicability of *acquis communautaire*.

### **9.2.2 Ganges-Brahmaputra-Meghna**

This basin offers a rare opportunity to study evolution of water rules in almost 4000 year span of permanent settlement in the Gangetic plain. Water rules in the Laws of Manu and in the Kautilya's Arthashastra is suggesting that the foundations of the water rules used today, on the international arena were laid down in the period between 4<sup>th</sup> and 2<sup>nd</sup> century BCE. Elaborate rules regarding:

- 1) Maintenance and protection of shared water infrastructure
- 2) Rules for water protection
- 3) Rules for compensation for withdrawal of water from shared water sources
- 4) Tax alleviation for those who maintained shared water infrastructure

Water rules and institutions in the Ganges-Brahmaputra-Meghna date back to 1900 BCE and water issues played significant role. Validity of Toynbee's model of challenge response could be tested of several examples including demise of the Harrapan civilization. The legal tradition Laws of Manu and Kautilya's Arthashastra was distorted by the British colonial rule. British model preferred laws safeguarding riparian rights of landowners to laws safeguarding public ownership of water sources.

Modern institutional framework developed in the 20th century and is based on three bilateral treaty complexes between India and its neighbours. The structure of the institutional framework is heavily influenced by power asymmetry. Contrary to most of the quantitative researches published in recent years plain amount of valid treaties or River basin organizations has a low predictability value, when the structure and content of the institutional framework is disregarded.

Two treaty complexes are linking three separate dyads of states in the GBM basin. Institutional framework could be likened to wheel and then India would be a hub and bilateral links would be a spokes. The “Dharma Chakra” wheel is also incidentally on the Indian flag.

Treaty network is incomplete and centralised. It is not resilient against any form of socioeconomic development in Tibet. Lack of multilateral arrangements makes the communication regarding water matters difficult between headwater states (Bhutan, Nepal, China) and downstream Bangladesh. Geopolitical changes in the basin, including decolonization, Indo-Pakistani and Sino-Indian wars, emergence of Pakistan, does not seem to have effect on the performance of the institutional framework, once it is established.

Treaty instruments have specific water allocation mechanisms. Rigid water allocations have to be balanced by flexibility enhancing mechanisms like Joint commissions, limited treaty lifespan, mandatory renegotiation and conflict resolution mechanisms. Annual variability of flow is addressed in the treaties on the basis of 40 years of data collecting, and addresses the predictable seasonal changes. Extreme fluctuations are not addressed directly, but incorporated dispute resolutions mechanisms, should compel the signatories to negotiate peaceful settlement. In the aftermath of *Gabčíkovo-Nagymaros Judgement* it would be very difficult for a signatory state to terminate the treaty on the most common grounds defined by *1969 Vienna convention on the Law of the Treaties*.

Treaty mechanisms are prone to biophysical stressors and socioeconomic stressors. Most salient biophysical and socioeconomic stressors are: Unsustainable pattern of population growth, growth of industrial demand for water and hydroelectricity. Identified changes will lead to the calls for readjustment of the current allocation schemes in the future. Another adverse effect is contesting of the validity of institutional registered in Nepalese stance towards ratification of the 1996 Mahakali Treaty.

Without comprehensive basin wide approach, it will be impossible to construct the technical capacities for sufficient water reserves. These capacities will have to be built on the territory of Nepal and Bhutan and cover the combined demand of both India and Bangladesh providing the Chinese demand will not increase. It is highly unlikely, that

neglected Chinese riparian rights will remain neglected forever. Chinese investment in Tibet (Xizang autonomous region) suggest otherwise.

### **9.2.3 Euphrates and Tigris (Shatt-Al-Arab)**

The process of evolution of water related rules in Fertile Crescent and in Mesopotamia in particular took almost 6000 year to settle down. The system of irrigation channels, that was vital for agricultural production and lasted for thousands of years was developed and maintained through simple rules. These rules were based on the principles, which are very similar to the principles customary international water law. Principles of contemporary water law are not a modern artificial constructs, but ancient principles evolving from the dawn of mankind. The similarity does not end there. Water conflicts were leading to first institutional arrangements between the ancient states and within their socio-political fabric. Water technology and infrastructure were drivers of development of more advanced institutional mechanisms since, because they required more advanced division of responsibility between the members of society.

Islamic water law confirms these findings, as it was allowing the customs of pre-Islamic times to enter the canon of Shariatic water law. *No harm rule* and *benefit sharing* were integral part of their water law system.

Modern international water law and institutional is also exhibiting properties of a system, that emerged out of relations between sovereign actors. Water is used to gain political leverage in the region, which is an impediment to more holistic cooperation schemes. Turkey linking ousting of PKK from Syria is preeminent example of such practices. The statistical analysis of the institutional frame work does not prove useful. Author found out, that there are much more legal documents, than was estimated before, but also that the normative content of the documents is very low. The permanent water commissions are not playing important part in the basins water politics. The framework is anchored to two agreements that were thought to be provisional at the time of signature. One is guaranteeing specific amount of water on the Euphrates and one is dividing the water between Syria and Iraq. The major stressors, such as uneven regional development,

unilateral development projects, and seasonal water flow variations are not addressed by the institutional framework.

The gaps are structural and content related. Structure does not include all the resources (Tigris is not included) and all the important riparian countries (Iran). This may decrease water availability in unstable Iraqi region around Shatt-al-Arab. This is still considered an unresolved territorial issue. The regional politics is divided into several economic and military alliances, which are going across the watershed making the cooperation more difficult. Nevertheless the latest regional water related events suggest, the modest improvement in relations between the three most important riparians. According to (Daoudy 2009) the Iraqi Water Resources Minister visited Syria and Turkey to meet about the resumption of trilateral talks and agree on flow increases from upstream sources into the both rivers at 2008.

#### **9.2.4 Mekong**

The Mekong river basin is a good case of complex relations between states, and rivalry among water institutions. (Ratner, 2003) The Mekong has six riparians grouped into three different water institutions or programs including the Mekong River Commission, Greater Mekong Sub-region and Quadruple Economic Cooperation. MRC has four lower Mekong countries and QEC includes four upper Mekong countries, while Thailand and Laos are members of all three organizations at the same time. All six riparians are members of GMS. The Mekong River Commission has the longest history of cooperation and has the support of various international organizations including UNDP, but has failed to attract China and Myanmar as members. The greater Mekong Sub-region program founded by ADB, has the advantage of all six riparians being members allowing to it proceed with the implementation of large scale water infrastructures such as the Nam Theung 2 hydroelectric project in Laos. China is the greatest supporter of QEC and of the Agreement on Commercial Navigation on Lancang-Mekong River. This treaty was signed to improve navigability of the Mekong and to allow Chinese ships to reach sea-ports in Thailand. Rapids and shoals were blasted to remove obstacles for the large ships. This has not been good news for the Mekong River Commission which could have used navigability of the Mekong to improve its bargaining position in negotiating Chinese participation in its structures.

Are the relations on Mekong truly complex or just complicated? The answer lies in the emergence of the number of rival institutions in the region. Emergent structures may rise from the watershed as a result of the patterns of relationships between the agents. Water institutions are always a result of interactions between riparian states. *System is complex in the sense that a great many independent agents are interacting with each other in a great many ways.* (Mitchell Waldrop, 1992)

It was not intended or planned to have overlapping institutions on the Mekong. They emerged from negotiations between states and they are not an outcome of rational planning. If it were otherwise, we would probably not have an incoherent institutional framework with several rival institutions.

The institutional framework as system is more resilient, because it has more properties of a complex adaptive system and emergent behaviour of self-organization do play an important role on this level.

### **9.2.5 The Aral Sea Case**

The institutional framework of the Aral Sea can be divided into two groups. The first group subsumes soft law basin-wide water institutions incorporated into a multilateral declaration and joint institutions as the 1992 Agreement on Cooperation and Interstate Commission on Water Coordination (ICWC), which was later integrated with International Fund for the Aral Sea (IFAS) in 1997. This soft law institutional arrangement has two purposes:

1. Coordinate the state's water policies
2. Create a platform for distribution of funds contributed by international donors (World Bank, GEF, European Union, UNDP, UNESCO, USAID, SIDA etc.)

The first group of institutions may be resilient to potential geopolitical stress to a certain degree as its primary purpose is likely fundraising from the international donor community. This matter will need a further detailed survey.

The second group consists of more specific "hard law" instruments like the 1997 Treaty on *Use of the Syr Darya Water Resources* and the 1996 Treaty on the *Use of Water and Energy*

*Resources of the Syr Darya River basin.* These treaties were aimed at finding the solution to the water issue and energy sharing in the Syr Darya River basin. Two *hard law* treaties with water allocation mechanisms have failed, because of non-compliance. No consensus was reached on submitting the case to the *International Court of Justice*.

### **9.3 The Final Remark**

This dissertation was aiming to bring new theoretical approaches along with the new results from already studied watersheds. The selection of case studies includes the watershed that has been studied many times. Someone familiar with the previous attempts would be surprised, delighted or maybe provoked by some conclusions in this dissertation. Author waits in anticipation that someone will find useful all the details about institutional arrangements in the transboundary watersheds. Maybe the details were too many, that they made the work harder to read, but on the other hand the dissertations are usually read by someone with a very narrow specialization. The above mentioned conclusion will hopefully spark an interest on water conflict and cooperation among international lawyers. Author would be delighted, if this specialized study will help to broaden the ranks of the lawyers, who be eager to join exquisite company of Stephen McCaffrey, Patricia Wouters, Joseph Dellapena, Helga Haffterdorn and other eminent international lawyers specializing in international water law.

## 10 List of References

- Ahmad, Q. K., Ashton, P., Biswas, A. K., Björklund, G., Braga, B., Tucci, C., Delli Priscoli, J., et al. (2000). Actual Cases of Shared Water Resources. *Water Security for Multinational Water Systems - Opportunity for Development*. Stockholm: Stockholm International Water Institute (SIWI).
- Alamgir, M. (1980). *Famine in South Asia: Political Economy of mass starvation* (p. 420). Greenwood Press.
- Alberts, D. (1997). Complexity, global politics, and national security. *National Defense University*. Washington, D.C.
- Allan, J. A. (2002). *The Middle East water question: hydropolitics and the global economy* (p. 400). I.B. Tauris.
- Alvarez-Jiménez, A. (2011). New Approaches to the State of Necessity in Customary International Law: Insights From WTO Law and Foreign Investment Law. *Revista Paginas*, (87), 1-39.
- Anand, C. L. (1944). *The government of India act, 1935: with a critical introduction and commentaries*. University Book Agency.
- Andras, C. (1967). *Neighbors On The Danube: New Variations on the Old Theme of Regional Cooperation*. Hungary: Radio Free Europe.
- Axelrod, R. M. (1997). *The complexity of cooperation: agent-based models of competition and collaboration*. Princeton University Press.
- Baeva, O. (2002). *Water conflicts: an annotated bibliography for 1996-2001. Africa*. Oslo University College & International Peace Research Institute, Oslo (PRIO).
- Bagis, A. I. (1997). Turkey's Hydropolitics of the Euphrates-Tigris Basin. *International Journal of Water Resources Development*, 13(4), 567-582. doi:10.1080/07900629749647
- Baillat, A. (2004). Hydropolitics in Small Mountainous States Two Cases of Cross-Asymmetries: The Kingdom of Lesotho and the Republic of South Africa The Kingdom of Nepal and The Republic of India. Geneva.
- Barnaby, W. (2009). Do nations go to war over water? *Nature*, 458(7236), 282-3. doi:10.1038/458282a

- Biswas, A. K. (2008). Management of Ganges-Brahmaputra-Meghna system: way forward. *Management of transboundary rivers and lakes* (pp. 143–164). Springer.
- Bloesch, J., Gutknecht, D., & Iordache, V. (2005). *Report on the International Workshop “Hydrology and Limnology – Another Boundary in the Danube River Basin” held in Petronell, Austria, 14-16 October 2004*. October (p. 46).
- Bostian, I. L. (2000). Environmental Consequences of the Kosovo Conflict and the NATO Bombing of Serbia. *Colorado Journal of International Environmental Law and Policy*, 11.
- Brashko, V. (2002). Anthrax on Vozrozhdenie Island. *Bulletin of Interstate Coordination Water Commission of Central Asia (ICWC)*, 1(29), 54.
- Buhler, G. (1886). *The laws of Manu*. Clarendon Press.
- Butzer, K. W. (1976). *Early Hydraulic Civilization in Egypt: A Study in Cultural Ecology*. (L. G. Butzer, Karl W.; Freeman, Ed.) *Prehistoric archeology and ecology* (Vol. 80, pp. 179-180). Chicago and London: The University of Chicago Press. doi:10.1525/aa.1978.80.1.02a00720
- Caponera, D. A. (1992). *Principles of water law and administration: national and international*. A.A. Balkema.
- Carius, A., Feil, M., & Switzer, J. (2003). *The case of Central Asia and South Easatern Europe: Environment and Security Transforming risks into cooperation*. UNEP (ROE), UNDP and OSCE (p. 36).
- Cobbet, P. (1909). *Cases and Opinions on International Law* (3rd ed.). London: Stevens and Haynes.
- Cohen, J. E. (1991). International law and the water politics of the Euphrates. *New York University journal of international law & politics*, 24(1), 503-556.
- Cosgrove, W. J. (2003). *Water security and peace: a synthesis of studies prepared under the PCCP-Water for peace process*. *Technical documents in hydrology*. Unesco.
- Costanza, R., Low, B., Ostrom, E., & Wilson, J. (2001). *Institutions, Ecosystems, and Sustainability*. (p. 270). Boca Raton: Lewis/CRC Press.
- Daoudy, M. (2009). Asymmetric Power: Negotiating Water in the Euphrates and Tigris. *International Negotiation*, 14(2), 361-391. doi:10.1163/157180609X432860
- Dellapenna, J. W. (1996). The Two Rivers and the Lands Between: Mesopotamia and the International Law of Transboundary Waters. *Birigham Young University Journal of Public Law*, 213-61.

- Dellapenna, J. W. (2001a). Foreword: bringing the customary international law of transboundary waters into the era of ecology. *Int. J. Global Environmental Issues*, 1(3), 243-249.
- Dellapenna, J. W. (2001b). The customary international law of transboundary fresh waters. *Int. J. Global Environmental Issues*, 1(4), 264-305.
- Dellapenna, J. W. (2004). *The International Law Association's Berlin Rules on Water Resources*. *Water Resources* (p. 2).
- Dellapenna, J. W., & Gupta, J. (2009). *The evolution of the law and politics of water*. Springer.
- Dhungel, D. N., & Pun, S. B. (2009). *The Nepal-India Water Relationship: Challenges*. Springer.
- Dinar, A., & Saleth, M. R. (1999). Evaluating Water Institutions and Water Sector Performance. *World Bank Technical Paper*. World Bank.
- Dinar, S. (2009). Scarcity and Cooperation Along International Rivers. *Global Environmental Politics*, 9(1), 109-135. doi:10.1162/glep.2009.9.1.109
- Dukhovny, V. A. (2002). "Dialogue on Water And Climate" Aral Sea Basin Case Study. *Scientific-Information Center of the Interstate Coordination Water Commission of the Aral Sea basin*.
- Dukhovny, V. A., & Sokolov, V. I. (2003). Lessons on cooperation building to manage water conflicts in the Aral Sea Basin. *World Water Assessment Programme*.
- Dukhovny, V. A., & Sokolov, V. I. (2005). Challenges and Actions for Integrated Approaches. *World Water*. Almata.
- Dukhovny, V. A., Umarov, P., Yakubov, H., & Madramootoo, C. A. (2007). Drainage in The Aral Sea Basin. *Irrigation and Drainage*, (56), 91-100. doi:10.1002/ird
- D'Amato, A. (1987). Trashing Customary International Law. *The American Journal of International Law*, 81(1), 101-105. JSTOR.
- D'Amato, A. (2005). International law as an autopoietic system. *Developments of International Law in Treaty Making, Berlin, Heidelberg*, 295(2001), 335-399.
- D'Amato, A. (2009). International law as a unitary system. *Routledge handbook of international law*. Chicago.
- D'Amato, A., & Engel, K. (1995). *International Environmental Law Anthology. Regulation*. ANDERSON PUBLISHING COMPANY.

- El-Fadel, M., El Sayegh, Y., Ibrahim, A. A., Jamali, D., & El-Fadl, K. (2002). The Euphrates-Tigris basin: a case study in surface water conflict resolution. *Journal of Natural Resources and Life Sciences Education*, 31, 99–110.
- Elhance, A. (1999). *Hydropolitics in the Third World: Conflict and Cooperation in International River Basins* (p. 296). United States Institute of Peace.
- Erdi, P. (2008). *Complexity Explained. Biophysics* (p. 397). Berlin: Springer.
- Faruqui, N. I., Biswas, A. K., & Bino, M. J. (Eds.). (2001). *Water Management in Islam* (p. 149). Tokyo: United Nations University Press.
- Fisher, F. M., Huber-Lee, A., & Amir, I. (2005). *Liquid assets: an economic approach for water management and conflict resolution in the Middle East and beyond* (p. 242). Washington, D.C.: Resources for the Future.
- Flint, C. (2004). *The Geography of War and Peace: From Death Camps to Diplomats* (p. 480). Oxford University Press, USA.
- Flint, C. (2006). *Introduction to Geopolitics* (2nd ed.). Routledge.
- Friedrich, J. (2009). Uranium contamination of the Aral Sea. *Journal of Marine Systems*, 76(3), 322-335. Elsevier B.V. doi:10.1016/j.jmarsys.2008.03.020
- Fuyane, B., & Madai, F. (2001). The Hungary-Slovakia Danube River dispute: implications for sustainable development and equitable utilization of natural resources in international law. *International Journal of Global Environmental Issues*, 1(3/4), 329. doi:10.1504/IJGENVI.2001.000983
- Fürst, H. (2006). The Hungarian-Slovakian Conflict over the Gabčíkovo-Nagymaros Dams: An Analysis. *Institute for Peace Research and Security Policy. University of Hamburg, Hamburg, Germany.*[[www.columbia.edu/cu/sipa/REGIONAL/ECE/furst3.pdf](http://www.columbia.edu/cu/sipa/REGIONAL/ECE/furst3.pdf)], 1(1997), 1-15.
- Giordano, Meredith a, & Wolf, A. T. (2003). Sharing waters: Post-Rio international water management. *Natural Resources Forum*, 27(2), 163-171. doi:10.1111/1477-8947.00051
- Glassner, M. I. (1996). *Political Geography* (2nd ed., p. 711). New York: John Willie and Sons, Inc.
- Gleick, P H, Cooley, H., & Katz, D. (2006). *The world's water, 2006-2007: the biennial report on freshwater resources*. Island Press.
- Gleick, Peter H. (1993). Water and conflict: Fresh water resources and international security. *International Security*, 18(1), 79–112.

- Gleick, Peter H. (2003). Global Freshwater Resources: Soft-Path Solutions for the 21st Century. *Science* Vol. 302. *Science*, Vol.302.
- Griffin, W. L. (1959). The Use of Waters of International Drainage Basins Under Customary International Law. *American Journal of International Law*, 53(1).
- Griffiths, S. P. C. I. E. (1965). *The British Impact on India* (p. 520). New York, NY Archon Books.
- Grotius, H. (1625). *De Jure Belli ac Pacis Libris Tres*. Paris.
- Gunderson, L., Holling, C. S., Pritchard, L., Peterson, G. D., & Munn, T. (2002). The Earth system: biological and ecological dimensions of global environmental change. In H. A. Mooney & J. G. Canadell (Eds.), *Encyclopedia of Global Environmental Change* (Vol. 2, pp. 530-531). Scientific Committee on Problems of the Environment (SCOPE).
- Haftendorn, H. (2000). Water and international conflict. *Third World Quarterly*, 21(1), 51-68. doi:10.1080/01436590013224
- Hallaq, W. B. (2005). *The Origins and Evolution of Islamic Law. Continuity and Change*. Cambridge University Press.
- Hammond, D. (2003). *The science of synthesis: exploring the social implications of general systems theory*. University Press of Colorado.
- Hardin, G. (1968). The tragedy of the commons revisited. *Science, New Series*, 162(3859), 1243-1248. doi:10.1056/NEJMopv0907258
- Hathaway, O. A. (2004). The promise and limits of the international law of torture. *Torture, ed. Sanford Levinson. New York: Oxford University Press* (pp. 199–212).
- Hiebert, M. (1991). Muddy Waters. *Far Eastern Economic Review*.
- Homer-Dixon, T. F. (1999). *Environment, scarcity, and violence*. Princeton University Press.
- Howley, J. (2009). The Gabcikovo Nagymaros Case: The Influence of the International Court of Justice on the Law of Sustainable Development. *Queensland Law Student Review*, 2(1).
- Jain, S. K., Agarwal, P. K., & Singh, V. P. (2007). *Hydrology and Water Resources of India* (p. 1303). Springer.
- Jägerskog, A. (2003). *Why states cooperate over shared water : The water negotiations in the Jordan River Basin. Middle East*. Linköping University.

- Kamkongsak, L., & Law, M. (2001). Laying waste to the land: Thailand's Khong-Chi-Mun Irrigation Project. *Watershed*, 6(3).
- Keller, H. A., & Kalff, P. B. (1967). *Recent developments in international water law*.
- Khalid, I. (2011). Trans-Boundary Water Sharing Issues: A Case of South Asia. *Journal of Political Studies*, 1(2), 79-97.
- Khanh, T. T. (2003). *Death of A River: The Mekong River and the Chinese Development Projects Upstream*. *Bulletin Vietnamien* (Vol. 19).
- Kibaroglu, Aysegul. (2002). *Building a Regime for the Waters of the Euphrates-Tigris River Basin* (p. 356). Springer.
- Kibaroglu, A., & Ünver, I. (2000). An Institutional Framework for Facilitating Cooperation in the Euphrates-Tigris River Basin. *International Negotiation*, 5(2), 311-330. doi:10.1163/15718060020848785
- Kolars, J. (1994). Problems of International River Management: Case of Euphrates and Tigris. In A. K. Biswas (Ed.), *International Waters of the Middle-East Frome Euphrates-Tigris to Nile* (Water Res., pp. 44-94). Oxford University Press.
- Kucukmehmetoglu, M., & Guldman, J.-M. (2010). Multiobjective Allocation of Transboundary Water Resources: Case of the Euphrates and Tigris. *Journal of Water Resources Planning and Management*, 136(1), 95. doi:10.1061/(ASCE)0733-9496(2010)136:1(95)
- Landovsky, J. (2006). Human Development Report 2006 - Institutional Assessment of Transboundary Water Resources Management. *Human Development Report Office OCCASIONAL PAPER*, (36), 23. doi:UNDP
- Laszlo, F., Csanyi, B., & Literathy, P. (2000). Cyanide and heavy metal accidental pollution in the Tisza River basin: consequences on water quality monitoring and assessment. *Proceedings of International Workshop on Information for Sustainable Water Management*. Ed.: JG Timmerman et al (pp. 65-70).
- Leal, D. R. (1998). Community-Run Fisheries: Avoiding the " Tragedy of. *Journal of Interdisciplinary Studies*, 19(3), 225-245.
- Linnerooth-Bayer, J., & Murcott, S. (1996). Danube River Basin: International Cooperation or Sustainable Development, *The. Nat. Resources J.*, 36, 521. HeinOnline.
- Lipschutz, R. D. (2000). Damming Troubled Waters: Conflict over the Danube, 1950-2000. *Conflict*, 1(2).

- Lupu, Y. (2001). International Law and the Waters of the Euphrates and Tigris. *Geo. Int'l Env'tl. L. Rev.*, 14, 349. HeinOnline.
- Luttwak, E. N. (1979). *The Grand Strategy of the Roman Empire: From the First Century A.D. to the Third (Johns Hopkins Paperbacks)* (p. 272). The Johns Hopkins University Press.
- Létolle, R., & Chesterikoff, A. (1999). Salinity of surface waters in the Aral sea region. *International Journal of Salt Lake Research*, 8(4), 293-306. doi:10.1007/BF02442116
- Makim, A., & Gene, A. (2002). The Changing Face of Mekong Resource Politics in the Post-Cold War Era: re-negotiating arrangements for water resource management in the Lower Mekong River Basin ( 1991-1995 ).
- Martinović-vitanović, V., & Kalafatić, V. (2000). Water Quality , Sediment and Aquatic Organisms of the Danube Prior and After NATO Air Strikes. *Water*.
- Maturana, H. R., & Varela, F. J. (1980). *Autopoiesis and cognition: the realization of the living*. D. Reidel Pub. Co.
- Mays eds., L. W. (2010). *Ancient Water Technoligies. Media*. Dordrecht Heidelberg London New York: Springer. doi:10.1007/978-90-481-8632-7
- McCaffrey, S. C. (1999). International Water Law for The 21st Century: The Contribution of The U.N. Convention. *Water Law*, 97(1998).
- McCaffrey, S. C. (2003a). The Need for Flexibility in Freshwater Treaty Regime. *Natural Resources Forum*, 27, 156- 162.
- McCaffrey, S. C. (2003b). *Resolution of International Water Disputes (Permanent Court of Arbitration/Peace Palace Papers)* (p. 456). Kluwer Law International, International Bureau of the Permanent Court of Arbitration.
- McCaffrey, S. C. (2004). The human right to water revisited. *Water and International Economic Law*, 1-38.
- Micklin, P. (2010). The past, present, and future Aral Sea. *Lakes & Reservoirs: Research & Management*, 15(3), 193-213. doi:10.1111/j.1440-1770.2010.00437.x
- Mitchell Waldrop, M. (1992). *Complexity: The Emerging Science at the Edge of Order and Chaos*. Simon & Schuster.
- Mitchell, M. (2009). *Complexity - Guided tour. Complexity* (p. 349). New York: Oxford University Press.
- Naff, T., & Dellapenna, J. W. (2002). Can there be confluence ? A comparative consideration of Western and Islamic fresh water law. *Water Policy*, 4, 465-489.

- Nakayama, M. (1995). Transition from Mekong Committee to Mekong River Commission, 1-7.
- Nielsen, T. K. (2008). River basin management. *October*.
- Nishat, A., & Faisal, I. M. (2000). An Assessment of the Institutional Mechanisms for Water Negotiations in the Ganges-Brahmaputra-Meghna System. *International Negotiation*, 5(2), 289-310. doi:10.1163/15718060020848776
- Noorani, A. G. A. M. (2011). *India-China Boundary Problem, 1846-1947: History and Diplomacy*. Oxford University Press.
- Peterson, D. J. (1993). *Troubled lands: The Legacy of Soviet Environmental Destruction. Reviews in Anthropology* (Vol. 20). Westview Press. doi:10.1080/00988157.1991.9977989
- Priscoli, J. D. (2001). River Basin Organizations. *transboundarywater.geo.orst.edu*.
- Rahaman, M. (2009). *Integrated Water Resources Management: Constraints and Opportunities with a focus on the Ganges and the Brahmaputra river basins*. Water. Water & Development Publications – Helsinki University of Technology.
- Rahaman, M. M. (2001). Water versus power : Role of dams in geopolitics of Ganges basin. *Water Resources*, 1-10.
- Rahi, K. a, & Halihan, T. (2009). Changes in the salinity of the Euphrates River system in Iraq. *Regional Environmental Change*, 10(1), 27-35. doi:10.1007/s10113-009-0083-y
- Rajaei, F. (1993). *The Iran-Iraq war: the politics of aggression*. University Press of Florida.
- Ratner, B. D. (2003). The politics of regional governance in the Mekong River Basin. *Global Change, Peace & Security*, 15(1), 59-76. Routledge. doi:10.1080/0951274032000044522
- Richardson, M. (2002). Sharing the Mekong: an Asian challenge. *The International Herald Tribune*.
- Sagoff, M. (2008). *The Economy of the Earth , Second Edition. Environment*. Cambridge: Cambridge University Press.
- Salman, M. A., & Uprety, K. (1999). Hydro-Politics in South Asia : A Comparative Analysis of the Mahakali and the Ganges Treaties. *Natural Resources Journal*, 39(2).
- Salman, S. M. A. (2007). The Helsinki Rules, the UN Watercourses Convention and the Berlin Rules: Perspectives on International Water Law. *International Journal of Water Resources Development*, 23(4), 625-640. doi:10.1080/07900620701488562

- Samson, P., & Charrier, B. (1997). *International Fresh Water Conflict: Issues and Prevention Strategies*. Green Cross International.
- de Schutter, J., & Dukhovny, V. A. (2003). *Project "Science For Peace"; South prearalie – new perspectives*. *Joop Journal Of Object Oriented Programming*. Tashkent.
- Schwabach, A. (2000). Environmental Damage Resulting from the NATO Military Action against Yugoslavia. *Columbia Journal of Environmental Law*, 25.
- Shalpykova, G. (2002). *Water Disputes in Central Asia: The Syr Darya River Basin*. International University of Japan.
- Shaw, M. N. (2008). *International Law* (6th ed.). Cambridge.
- Shiva, V. (1991). *Ecology and the politics of survival: Conflicts over natural resources in India* (p. 365). Sage Publications.
- Sievers, E. W. (2002). Water, conflict, and regional security in Central Asia. *NYU Env'tl. LJ*, 10(2), 356. HeinOnline.
- Sisson, R., & Rose, L. E. (1991). *War and Secession: Pakistan, India, and the Creation of Bangladesh*. University of California Press.
- Stefano, L. D., Duncan, J., Dinar, S., & Stahl, K. (2010). Mapping the Resilience of International River Basins to Future Climate Change-Induced Water Variability. *World*.
- Swain, A. (2004). *Managing Water Conflict: Asia, Africa and the Middle East* (p. 256). Routledge.
- Turton, A., & Funke, N. (2008). Hydro-hegemony in the context of the Orange River Basin. *Water Policy*, 10(2), 51–69.
- Uitto, J. I., & Wolf, A. T. (2002). Water Wars? Geographical Perspectives: Introduction. *The Geographical Journal*, 168.
- Voshchenkov, K. P. (1969). Stati: K Istorii voprosa o demokraticeskom Reshenii Dunaiskoi problemy. *Voprosy istorii*, (7), 78-88.
- Waltz, K. N. (1979). *Theory of International Politics*. (1st, Ed.) (p. 250). London: McGraw-Hill.
- Weber, M. (2004). *The Vocation Lectures: Science As a Vocation, Politics As a Vocation*. (D. S. Owen, T. B. Strong, & R. Livingstone, Eds.) (p. 100). Hackett Pub Co.
- Weber, S. (1999). Seeds of urbanism: palaeoethnobotany and the Indus Civilization. *Antiquity*, 73(February 1999), 813-26.

- Westing, A. H. (1986). *Global resources and International Conflict: Environmental Factors in Strategic Policy and Action*. New York: Oxford University Press.
- Wiebe, H. (2000). Flood Action Plan in Bangladesh. *Water Management*.
- Wittfogel, K. (1957). *Oriental despotism; a comparative study of total power*. New York: Random House.
- Wolf, A. T. (1999). Criteria for equitable allocations: The heart of international water conflict. *Natural Resources Forum*, 23(1), 3-30.
- Wolf, A. T. (2007). Shared Waters: Conflict and Cooperation. *Annual Review of Environment and Resources*, 32(1), 241-269. doi:10.1146/annurev.energy.32.041006.101434
- Wolf, A. T., & Delli Priscoli, J. (2009). Case Study of Transboundary Dispute Resolution: the Ganges River controversy. *Managing and Transforming Water Conflicts* (first.). Cambridge University Press.
- Wolf, A. T., Natharius, J. A., Danielson, J. J., Ward, B. S., & Pender, J. K. (1999). International River Basins of the World. *International Journal of Water Resources Development*, 15(4).
- Wolf, A. T., Yoffe, S. B., & Giordano, Mark. (2003). International waters : identifying basins at risk. *Water Policy*, 5, 29-60.
- Woods, H. C. (1921). The Danube as an International Highway. *Fortnightly Review*, 66(August).
- Wouters, P. K. (1993). *Equitable Utilization or non-appreciable harm?: theory and practice in the allocation of the non-navigational uses of international watercourses: in search of the governing rule(s) (working title)*. Bibliography (books/articles).
- Wouters, P. K., Vinogradov, S., Allan, A., Jones, P., & Rieu-clarke, A. (2005). *Sharing Transboundary Waters An Integrated Assessment of Equitable Entitlement*. Organization (Vol. UNESCO/IHP). Paris.
- Yoffe, S. B., & Wolf, A. T. (1999). Water, conflict and cooperation: Geographical perspectives. *Cambridge Review of International Affairs*, 12(2), 197-213.
- Zeitoun, M. (2008). *Power and Water in the Middle East: The Hidden Politics of the Palestinian-Israeli Water Conflict* (p. 224). I. B. Tauris.
- Zisgen, B. W. (1962). *The principles of international water law: a case study of their role in the Nile Waters Sgreement of 1959*. Smith College, Northampton, Mass.