

# Cooperation or conflict ? Critical issues on transboundary water management

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**Abstract-** Transboundary water management is a critical issue as it concerns more than 40% of the total world population and affects more than 275 river basins worldwide. However, roughly two-thirds of these basins do not have a cooperative management framework. Differences between riparian countries in terms of status of socioeconomic development, infrastructure capacity, political alterations as well as institutional and legal disparities represent significant challenges to effective and coordinated management of transboundary water resources. High interdependency and uncertainty, geopolitical scenery together with absence of effective institutional and legal framework for conflict resolution shape the problem of international transboundary river basins. This paper identifies and discusses transboundary water management issues mainly focusing on the benefits of cooperation and on how to improve the enabling environment for cooperation within a shared basin. Examples from different continents demonstrate the problems of cooperation or potential conflicts on water allocation, legal and data gaps, institutional modifications and major political disputes.

**Keywords –** Sustainability, transboundary river basins, conflict, water cooperation, water management

## I. INTRODUCTION

Shared water basins account for the 40% of global population, almost 153 countries and 60% of fresh water resources making the management of transboundary basins very important for development, peace and security [1,2]. No region of the world with shared international water is excused from water-related controversies, though the most serious problems occur in water-scarce regions. The international dimension of both environmental problems and the dominant economic crisis reinforce the concept of international cooperation to address them effectively.

Conflict in transboundary basins, may occur among others due to water availability issues [5, 6, 4], increased hydrological variability [3, 4], upstream-downstream relationships [7], the existence of transboundary bilateral agreements or treaties [8] or international water agreements [9], constructed dams without consensus, and the absence of institutional capacity [16,17].

Sharing and cooperation can provide substantial benefits that go far beyond those achieved by attempts to maximize national or individual interests. Efficient cooperation requires new forms of "diplomacy", alternative institutional arrangements, devotion of significant financial resources, and conflict management mechanisms. Administrative and natural boundaries of river basins rarely coincide. This mismatch is the source of various problems reported in the literature as far as joint planning is concerned, allocation of costs among riparian countries, exercise of power, and the whole range of issues associated with sustainable development. Cooperation and conflict are, then, expressions of the same quest for improving effective and efficient planning and for promoting new ways for sustainable transboundary water resources management.

This paper discusses the different parameters which affect sustainable transboundary water management and cooperation. Various examples demonstrate the different aspects of conflict and cooperation and their peculiarities.

## II. ISSUES OF SUSTAINABILITY

### *2.1 Basic principles of sustainability –Application in shared water basins*

The basic principles of sustainability, the 3Es, effectiveness, efficiency and equity, are characterized by joint efforts of riparian countries in transboundary water management. To achieve the principle of efficiency integrated management of water resources at the level of the whole river basin is required, with the development of common systems for monitoring and controlling quality and quantity water parameters, as well as joint water resource development plans. The principle of efficiency relates the distribution of costs of relevant infrastructure and the rehabilitation, protection and preservation of shared water deposits. The implementation of a series of economic instruments and rules in order to apply demand management practices but also the principles of fair and equitable water allocation are dominant. Equity, equitability endorses participatory and decentralized approaches and the adoption of rules and measures for the fair access and exploitation of water resources. Different water interests on various levels (regional, local, national) and different social, economic and environmental inter-dependencies hinder the implementation of the principles even in the same country, making the joint cooperation, collaboration and coordination of actions in shared basins a really more "challenging mission". Sources of conflict

### III. ISSUES OF CONFLICT

Conflicts arise because of water scarcity (permanent and temporary), because of complex social and historical factors, because of power asymmetries and hydro-political issues at stake (e.g. dam construction). All these issues will be exaggerated by climate change impacts mainly on water quantity and quality. The effective and sustainable way to deal with water problems is to apply integrated water resource management strategies encouraging the coordinated development and management of water, land, and related resources at the river basin scale. Important in the discussion is the “sovereignty” dilemma: how and under which conditions individual countries develop and use resources found within their territories and to what extent do they have to consider interests of riparian countries, and how will they benefit all from the interest of the river basin as a whole? Sources of conflict arise as development strategies should respect all riparian countries eventually and benefit from an equitable allocation of costs and benefits in the shared basin [11].

### IV. BENEFITS FROM COOPERATION

#### 4.1 Monitoring transboundary cooperation

In most cases, cooperation prevails to conflict and to armed conflict indeed. Wolf in [19] has found that in 60 years’ records (1948-2008) only 38 water related violence disputes are reported. 650 treaties related to water have been signed since 1820 and 1228 cooperative events (67.1%) and 507 conflictive events (27.7%) had been found from 1948-1999 Only ninety-six events (5.2%) were delineated as neutral or non-significant [10]. It is also clear that the existence of an agreement that applies to a basin is not equivalent to having a basin scale agreement [12]. Riparian states very often stress that cooperation may serve as a catalyst for their interests in water resources management and development and their objectives are better met through cooperation than through conflict [20, 21]. This is because the benefits of cooperation in a transboundary water basin tend to offset the gains of short-term unilateral action, which often come with considerable economic or political costs over the long term [18].

A prominent place in achieving the SDG6, has the target 6.5 which identifies the critical by also catalytic role of transboundary cooperation in achieving other SDGs as well. Multiple benefits can derive from transboundary cooperation on protection of human health, production of renewable energy, change of consumption patterns, sustainable ecosystem services, climate change adaptation and not only. 6.5.2 (implementation of integrated water resources management at all levels, including through transboundary water cooperation as appropriate) is an important step towards monitoring transboundary cooperation According to UNESCO [22], responsible for SDG6, SDG indicator 6.5.2 measures the proportion of a transboundary basin area (river, lake or aquifer) within a country with an arrangement for water cooperation in place. An ‘arrangement’ might include a bilateral or multilateral convention, memorandum understanding, exchange of information or any other formal commitment among countries. It should be said through that it doesn’t measure the outcomes of these arrangement, just their presence.

For an arrangement to be considered operational, all four of the following criteria must be met: i) Whether there is a joint body or mechanism in place; ii) should be at least annual meetings between riparian countries; iii) a joint or coordinated water management plan has been established or joint objectives have been set; and iv) at least annual exchanges of data and information take place.[23]

According to UNESCO, the results from the first report where 107 out of 153 countries with shared basins have participated reveal interesting gaps and information on transboundary rivers and lakes. 35 % of the world’s transboundary river basins are shared entirely by the 91 countries where the SDG indicator 6.5.2 value is not available. Which means that SDG indicator 6.5.2 reporting provides partial data on roughly two thirds of the world’s transboundary river basins. Only 17 countries have all their transboundary basins covered by operational arrangements, and 12 of the countries that reported have no operational arrangements in place. Also there exist but very few treaties and operational arrangement for transboundary aquifers. By the results it is clear that progress in transboundary water cooperation must be dramatically accelerated to ensure that target 6.5 is reached by 2030 and investments should be made for more concrete data acquisition and built upon the three international legal instruments to enhance transboundary cooperation.

The following table depicts the various benefits of cooperation according to Sadoff and Grey

Types of cooperation	The opportunity	Examples
Type 1: increasing benefits to the river	Degraded water quality, watersheds, wetlands, and biodiversity	the Elbe river, The Danube river, and Rhine river
“The ecological river”		
Type 2: increasing benefits from the river	Increasing demands for water, suboptimal water resources	Indus river, Nile river, Ganges, Jordan river

	management and development	
“The economic river”		
Type 3: reducing costs because of the river	Tense regional relations and political economy impacts	Tigris river, Euphrates river, Jordan river
The “political” river		
Type 4: increasing benefits beyond the river	Regional fragmentation	the Mekong river, Colorado river, Rio Grande river, Senegal and Niger La Plata River and the Titicaca Lake (Central America).
The “catalytic” river		

Table 1: C.W. Sadoff, D. Grey [25] Types of cooperation enhanced with examples

## V. BASIC LEGAL FRAMEWORK

### 5.1 Strong Incentive For Cooperation

The lack of adequate legal instruments between riparian countries hinders transboundary water cooperation. The two main legal documents which support transboundary water cooperation are the 1997 UN International Watercourses Convention [15] put into force in 2014 and the 1992 UNECE Water Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water of Helsinki Convention) [14]. Followed also by the adoption of the International Law Commission’s (ILC) Draft Articles on the Law of Transboundary Aquifers by the General Assembly in 2008. [22] Key differences between the UN Watercourse Convention and UNECE Water Convention mainly concern context rather than content.

The Water Convention builds upon the main principles of international law and supports IWRM by taking into account the interrelationship of socioeconomic and environmental parameters, by promoting joint organizational bodies for their management. It requires riparian countries to exchange data and elaborate plans and programs. As a framework agreement, the Water Convention [14] «does not replace bilateral and multilateral agreements for specific basins or aquifers; instead, it fosters their establishment and implementation, as well as further development». In 2003, an amendment to the UNECE Water Convention was proposed to allow states situated outside the UNECE region to become parties to this Convention.

The doctrine of “equitable and reasonable utilization” the prevention of significant harm and the prior notification of and consultation on planned measures with significant transboundary effects of the international law can be found in the UN International Watercourses Convention [13].

From all the continents Europe has the largest number of shared water basins but also a long history of environmental policy and relevant legal framework. The most integrated and comprehensive legal document, the WFD promotes the principles of sustainable water management and can work as a driver for cooperation [23]. The river basin scale of study, together with the national river management plans and the program of measures, all promote IWRM and sustainable development assuring the good ecological quality of all EU waters. The EU asks for a common river management plan in the case of shared basins between EU countries but does not have a specific dedicated institutional framework for transboundary issues. Emphasis is given on the national status of fulfilling the obligations of the WFD. Indeed, when the basins are shared by EU and non-EU countries each country can separately proceed to the development of its own water management plan. So even in EU the UNECE Water Convention remains the overarching legal framework for transboundary cooperation. An interesting example is the Danube River Protection Convention [24], establishing the legal basis for joint river basin management between 14 states and the European Union.

## VI. INSTITUTIONAL ARRANGEMENTS

According to [12] there are three major types of institutional arrangements for inter-state agreements on transboundary waters:

- a) without designation of an institution to implement the agreement
- b) appointment of governmental representatives
- c) establishment of a joint commission responsible for the implementation of the agreement, dominant in international cooperation.

River basin organizations (RBO) are mechanisms which can promote joint river management plans. Regular meetings at technical and political level allow for fruitful exchange of conversations and also negotiations of all involved parties' interests and plans for the use, exploitation and protection of common water resources. The ability of an RBO to turn discussions of the parties involved into effective decision making on the shared basins determine on a large scale its success [25]. Sometimes though, even if there is legal and institutional arrangements in place disputes emerge (Colorado river between USA-Mexico). The International Commission for the Protection of the Rhine (ICPR) is an example of good transboundary cooperation based on political will common interest, the respect and solidarity of the countries within the basin and the existence of high-level permanent secretariat. Schmeier [24] documented over 120 river basin organizations worldwide that often are effective in managing for changes in the system and in helping resolve disputes.

#### VII. DATA COLLECTION AND EXCHANGE

Systematic data acquisition and exchange and promotion of analytical studies is a prerequisite for informed decision making and facilitates water cooperation. Carefully designed and established common monitoring systems can provide warning, be proactive against pollution accidents or extreme events which more often occur due to climate change, thus supporting comprehensive responses which can at last save the life of both humans and the ecosystem. Credible public information and active involvement is the result of accurate data collection and management. The Transboundary Freshwater Dispute Database (<https://transboundarywaters.science.oregonstate.edu/content/transboundary-freshwater-dispute-database>) from the Oregon State University hosts a remarkable set of data and information about relevant research projects, interactive maps on transboundary water basins all over the global. Another important source of data is the International Groundwater Resources Assessment Centre (IGRAC) which deals with transboundary aquifers. The International Freshwater Treaties Database is searchable database of summaries and/or the full text of more than 600 international, freshwater-related agreements, covering the years 1820 to 2007. A current update is ongoing to bring the database to 2017. Both English and non-English language agreements are included. Where available, translations to English of non-English language documents are provided. The UNECE Water Convention (United Nations 1992), foresees the establishment of monitoring programs to assess the conditions of transboundary waters and inform the public accordingly.[19].

#### VIII. HYDRO-POLITICAL VULNERABILITIES

In EU the presence of water treaties, institutions, high level of development and its ability to tackle with transboundary water problems through cooperation mechanisms put EU in relatively low level of hydro-political vulnerability. Moreover the examples of cooperation of the joint committees in Danube, Rhine, Oder, Sava are some of the many examples of effective cooperation.

De Stefano [20] produced a matrix to quantify and examine hydro-political vulnerability through the following indicators: a) existence of a basin treaty, b) requirements on water allocation, c) water quality management, risk management cooperation, e) variability management f) cooperation relating to water infrastructure development, g) conflict resolution mechanisms h) institutional framework (existence of a joint body).

#### IX. GAP OF EFFECTIVE COMMUNICATION

Water professionals in different positions, planners, operators, researchers, academics, need to better promote the results of several research projects in the field of transboundary water management. The interface between theory and practice is weak. Results should turn to action.

#### X. SUGGESTED METHODOLOGY FOR AN INTEGRATED APPROACH IN TRANSBOUNDARY WATER MANAGEMENT

Political decision to cooperate on legal, engineering, environmental and administrative level.

2. Creation of a common background on a river basin level. Study and presentation of the existing situation in the shared river basin. Problem identification, major drivers of development, pressures and impacts, possible responses and preparation to produce joint river basin management plans. The study of the conjunctive use and management of common water resources, the minimization of environmental harm, the duty to cooperate and the sustainable use should be in the forefront of the discussion.

Establishment of common monitoring networks and acquisition of comparable data for the production of hydrologic/hydrogeologic maps, running of common simulation models and formulation of alternative scenarios for the management and protection of the transboundary river basin.

Recording and evaluation, promotion of high priority infrastructures (build new infrastructure, upgrade and

rehabilitate existing infrastructure) which will effectively deal with climate uncertainties. At the same time, there is a need for social consensus on the issues of cooperation between the riparian states for the mutual benefit of the region/state and joint funding of hydraulic works.

The establishment and operation of a joint organization River Management Body to guarantee a constant dialogue among the riparian parties, be in the place to negotiate and/or implement dispute resolution mechanisms when and if needed to safeguard peace, development, environmental protection and prosperity in the region.

Bilateral agreements / treaties or any kind of legal agreement need to be promoted between riparian countries giving emphasis not to the rights they feel they have on water resources but to the benefits from the equitable and fair allocation of water in a comprehensive manner in the whole river basin.

## XI. CONCLUSION

Sustainable transboundary water management and cooperation demands political will by the riparian countries to promote IWRM principles, update legislation in national and international level, commit financial means to implement joint management plans, establish information systems and harmonize and exchange data and technology regularly. Sustainable global, regional and basin-level legal and institutional frameworks is a powerful tool to improve cooperation, increase water security and counteract conflicts. At last, three notions co-exist :

CO- knowing in the sense of sharing the information CO-thinking leading to designing together  
CO-operating meaning acting together

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