

# Resolving Water Conflict And Engendering Co-Operation

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## Abstract

Projections concerning water in recent years by major international organizations have been consistently dire. Such as Water Resources Group projected that the world would face 40% water deficit under a business-as-usual climate scenario. In 2016, UNEP claimed that by 2030 almost 'half of the world's population will suffer from severe water stress'. Water has been and will continue to be a fundamental resource, which is a vital part of the production process of almost everything. Most essentially, it is indispensable in the generation and production of energy and food. Water security is a vital aspect of retaining political, economic and environmental security. With supplies declining (1.2 to 1.7 billion people struggle with shortages), water has been described as an "urgent security issue" by group of former heads of state and government. Water management matter are required in both "hard science" areas (physical science and engineering) and "soft science" areas (social, political, economic and others), beyond the usual trend. Insufficient access to safe fresh water contributes to a number of waterborne diseases, malnutrition, and poverty, economic and political instability and possible violent conflicts among countries or groups within a country. As at now, over one billion people have no access to safe water. This is a problem the World has to face as population grows from 6.8 billion people to approximately 9.0 billion by 2050. Water is a powerfully unifying resource, central to human life and our ecosystem, its management is generally diffused among the world's agencies and institutions. The paper concludes that in a transboundary basin users interconnected and this very inter-connectedness strengthens the case for the need for cooperative frameworks to manage transboundary water for common interests. The UN should seek to strengthen the capacity of parties to negotiate contested water issues. Therefore, parties must participate in conflict-resolution approaches and invest in institutional capacity with their neighbours so that a systemic, holistic water management can provide the opportunity for more users' water security.

**Key Words:** Water conflict; water/human security, transboundary waters; confidence building; water cooperation.

## Introduction

In recent decades, 'water crisis' and 'water wars' have become increasing the concern of water professionals, political scientists and the media, as demand for water gets to the limit of finite supply. Potential conflicts are brewing between nations that share common boundary freshwater reserves. As more than 50 countries on five continents might be engaged in water disputes except they move fast to establish agreements on how to share the water reservoirs, rivers, and underground aquifers. These started with the simplistic and erroneous assumption that the quantity of water available in the world for human use is limited. The fact that population, urbanization and industrial activities are all steadily growing, is used to predict that the world is facing a water crisis of extraordinary proportion, which may even result in wars between countries over water (Biswas, et al., 2019). Wendorf (2021) described "water wars" as conflicts between countries, states, or groups over the right to access water resources, usually freshwater. Freshwater is necessary for drinking, irrigation, and electricity generation, and conflicts occur when the demand for portable water exceeds the supply, or when allocation or control of water is disputed.

Projections by major international organizations in recent years have been consistently dreadful. For instance, in 2009, the 2030 Water Resources Group projected that the world would face 40% water deficit under a business-as-usual climate scenario; Similarly, in 2016, UNEP claimed that by 2030 almost 'half of the world's population will suffer from severe water stress'. Again, in 2017, UN Secretary-General Ban Ki-moon proclaimed that by 2030 the 'world may face 40% shortfall in water'. The World Bank has claimed that by 2050, about 1.8 billion people will be living under acute water scarcity. In 2018, the World Bank and the UN claimed that 36% of the

global population lives in water-scarce areas. The World Resources Institute (WRI) claimed that 33 countries will face ‘extremely high water stresses. According to the WRI analysis, seven countries will jointly rank as number one in terms of the most water-stressed countries of the world. All of them are in the Middle East, except for Singapore.

These statistics are frightening more so as have been repeated by academics, water professionals, political figures and Chief Executives of international organizations. The authenticity or validity of the data that generated these assumptions cannot be ascertained. Therefore, the basic question from those assertions is, are such scary predictions correct, or should we accept or reject them remains a latter issue.

Water has been and will continue to be a fundamental resource, which is a vital part of the production process of almost everything we make and do. Most essentially, it is indispensable in the generation and production of energy and food. Water security is a vital aspect of retaining political, economic and environmental security. With supplies declining (1.2 to 1.7 billion people struggle with shortages), water has been described as an “urgent security issue” by group of former heads of state and government, such that it was considered to be included in the Millennium Development Goals (MDGs).

Water poses both a threat and an opportunity for the UN system. Increasing scarcity of clean fresh water impedes development, undercuts human health, and plays critical roles along the conflict continuum between and within states. While rarely (if ever) starting a war between states, water allocation is often a key sticking point in ending conflict and undertaking national and regional reconstruction and development (Carius, et al., 2004). Kofi Annan in 2001 stated that “Fierce competition for fresh water may well become a source of conflict and wars in the future.” But in 2002, he reversed it this way, that “But the water problems of our world need not

be only a cause of tension; they can also be a catalyst for cooperation....If we work together, a secure and sustainable water future can be ours.”

The present paper aims to offer a comprehensive analysis of potential future water crisis and conflicts in a fast-changing world, major challenges in addressing future water planning and management issues, and also opportunities and directions for resolving future water problems.

### **Importance of Water**

In our everyday life, the importance of freshwater in every aspect of human lives, animals, plants, environments and ecosystems cannot be overemphasized. This could be compared with the difference between life and death, and between bounty and poverty. Therefore, proper planning and management of water is crucial, and particularly so when there is too little or too much, of it. Notwithstanding all the advances we have made, water planning and management continues to be challenging (Sivakumar, 2011). He further notes that ‘Part of this difficulty has been due to our inadequate understanding of the land, ocean and atmospheric systems, and their interactions and influences on water resources. However, population growth and its many associated effects (e.g. increase in water demand, industrialization, urbanization, water pollution, deforestation) have also played a significant role.

Recent estimates recorded that, about 900 million people in the world are without access to safe drinking water and about 2.6 billion people are without improved sanitation facilities (WHO/UNICEF, 2008; United Nations, 2010). Primarily because of these, and also of other associated factors, millions of people, the majority of which are children under the age of five years, die every year from water-related diseases, such as malaria, typhoid and cholera; indeed, water-borne diseases are the third leading cause of death from all infectious diseases mostly in developing world. Hydrological extremes, such as droughts and floods, often contribute to, or at

least exacerbate, these problems. While the present water situation and water-related problems are themselves grim, the future looks even worse, unless urgent measures are undertaken to stem the slide. According to Klare (2001) one billion people do not have access to safe water, a problem that will likely increase as the world population grows from 6.8 billion people now to about 9.0 billion by 2050. This problem likely will become especially severe in countries with high population growth rates that share a major source of freshwater with other countries. There are basically three important factors, among others, are likely to further complicate the water situation in the future, are explain below: (1) population growth; (2) global climate change; and (3) trans-boundary river basins.

**Population growth** is an important driver for water-related activities and problems, It is known that an increase in population usually leads to an increase in water demands in almost all sectors (domestic, industrial, agricultural, energy and recreation), unless water management practices become more efficient. Recent estimates by the United Nations (UN) indicate that the world population may increase from 6.7 billion in 2007 to 7.7 billion by 2020 and to 9.2 billion by 2050 (United Nations, 2007). This increase will occur mostly in the developing regions, whose population is projected to rise from 5.4 billion in 2007 to 7.9 billion in 2050. Since these regions are precisely the ones already facing significant water and sanitation problems, and struggling to deal with hydrological extremes whenever they occur, the future situation may likely get much worse.

**Global climate change:** As a result of the intensification of the greenhouse effect exert important implications either positive or negative for future water resources at the global, regional and local levels. The exact impacts are hard to predict. However, according to the majority of scientists, climate change will intensify the global hydrological cycle and will cause

more frequent and more severe hydrological extremes, such as droughts and floods (IPCC, 2007a; Kundzewicz *et al.*, 2008), although there are still questions about the methods used for making future projections and the reliability of outcomes (e.g. Koutsoyiannis *et al.*, 2008a). Based on the facts that water planning and management is more difficult during periods of droughts and floods, climate change may likely create a number of uncertainties.

**Trans-boundary Rivers:** According to Wolf *et al.*, (1999) & UNESCO (2009) there are over 260 river basins and 270 groundwater aquifers being shared by two or more nations. These trans-boundary waters cover over half of the Earth's surface and serve over half of the world's population. While they have been the sources of numerous conflicts between the nations sharing them, there have also been instances of them leading to cooperation (Wolf, 1998; Salman & Uprety, 2002; Earle *et al.*, 2010). The existing planning, development and management of these waters are already impeded; therefore, further population growth and global climate change may likely bring additional complications to the future planning and management of these trans-boundary waters.

### **Water Security, Human security and the Global Water Agenda.**

Jarraud (2013) noted that “Water fits within this broader definition of security, embracing political, health, economic, personal, food, and energy, environmental and other concerns and acts as a central link between them.” It is important to note that conflicts over water are rare. “Historically there hasn’t been a war between nations over water,” said Harriet Bigas, a co-author of the brief and colleague of Adeel at the Institute for Water, Environment and Health. Water issues do create friction between nations and have led to local internal conflicts, she said in an interview. Driven largely by water and food shortages linked to drought in the Horn of Africa, almost 185,000 Somalis fled to neighbouring countries in 2011. In Sudan, violence broke

out in March 2012 in the Jamam refugee camp where large numbers of people faced serious water scarcity. And in South Sudan, entire communities were forced to leave due to scarce water resources as a result of conflict in 2012.

Grey & Sadoff, (2007) note that 'Water security' is a concept that captures the threats to sustainable and safe water uses from natural and manmade pressures on water resources, through either water's presence, as in floods or inundation, or its absence, as in drought or contamination. United Nations-Water, (2013) on their part defined the concept as a population's capacity to ensure sustainable access to sufficient quantities of water at an acceptable quality for human, economic and environmental well-being. Water security assessments of transboundary waters are rare, but given the various potential threats to sustainable water, they will become more common. Water security focuses on concerns regarding changes due to climate change, water development and armed conflict (Petersen-Perlman, Veilleux & Wolf, (2017).

**Human Security:** Eldering, (2010) loosely defined human security as freedom from fear and freedom from want. On the other hand, the accepted concept of human security can have different applications, depending on the discipline, as result, it has been used interchangeably with water security; as water is the basis for human civilization in a broad sense, and human life in a specific sense (Petersen-Perlman, et al., 2017). They further observe that the relationships of an individual or community to a water resource as pertains to livelihoods, health, identity, culture or transportation can all have direct relationships with that individual or community's vulnerability, risk or stability. Assessing human security as it relates to water is especially important in situations of water scarcity, active conflict and natural disasters, including effects of climate change or economic development.

In circumstances which involve water resources development that either alters or removes water use by other basin stakeholders, the human security question becomes quite significant. Dam development is one instance of this kind of change. When a nation decides or a private corporation receives permission from a nation to develop a shared water resource, the quality, quantity and access to that resource may change for existing users. Even in cases of relocation, success rates for the river community's security are called into question. Occasionally, people with deep roots near a river are asked to become farmers or city-dwellers, or compensation packages may not be sustainable (Petersen-Perlman, et al., 2017). Measuring human security calls for both quantitative information, such as economics and mortality, and qualitative information, such as identity and culture. Changes to shared water resources on multiple scales can threaten the stability of human security and result in reverberating problems throughout a region (Veilleux, 2014). Water insecurity can lead to cascading political, social, economic and environmental consequences, she said. However, the norm is for nations and regional partners to work out water-sharing agreements, offering important opportunities for dialogue amongst traditional enemies. "Water is a greater pathway to peace than conflict," writes noted international water expert Aaron Wolf of Oregon State University. Even when nations are at war, they negotiate water-sharing agreements, Wolf says. Vietnam, Cambodia, and Laos continued the successful Mekong Committee to manage the Mekong River even during the Vietnam War (Leahy, 2013).

### **Threat of Water Shortage and Violence**

Some researchers perceive that there will not be adequate freshwater in the world to sustain all lives and ecosystems and as a result, there will be water scarcity and crisis (e.g. Gleick, 1993a; Postel, 1997; de Villiers, 1999; Barlow, 2007; Wood, 2008) and water related conflicts (e.g.



Gleick, 1993b; Shiva, 2002; Barlow, 2007). Although such an insight may have some merits, there are also important questions, especially on the basic reasons for future water crisis and water conflicts. As for water crisis, one argument is that the world is not facing water crisis because of actual physical scarcities of water, but may face water crisis because of widespread and continuous mismanagement of water (e.g. Biswas, 2006). But within states, water scarcity can assume an increasingly contentious and violent character when, for instance, water-dependent sectors such as irrigated agriculture can no longer sustain farming livelihoods, leading to destabilizing migration flows (Carius, et al., 2004). These arguments are supported by the fact that in nearly all developed and developing countries, water management practices and processes continue to be wasteful and suboptimal, including significant leakage/wastage in water supply/use and lack of proper treatment to maintain quality of water for household and other various uses. Another argument is that water scarcity is economically-driven, i.e. it is caused by lack of investment in water or lack of technological infrastructure for water as noted by Koutsoyiannis, (2011). As for water conflicts, it is argued that trans-boundary (and other shared) waters, while no doubt leading to potential conflicts, also lead to potential cooperation between and among, and benefits to, the nations/states sharing them, depending upon the basin and the prevailing situation (example Wolf, 1998; Elhance, 1999; Postel & Wolf, 2001; Salman & Uprety, 2002; Earle *et al.*, 2010; see also Biswas, 2011; Uprety & Salman, 2011; Tortajada & Pobre, 2011), for some specific case studies from Asia). Indeed, there are even concerns that water is not necessarily the root cause of the so-called “water conflicts,” but is sometimes simply used as a “weapon” to settle political and other ideological differences. According to Carius, et al., (2004) conflict prevention, conflict resolution, and post-conflict reconstruction efforts ignore water at their peril in key regions of the world (e.g., Southern and East Africa, including the

Great Lakes region; the Middle East; and Central, Southeast, and South Asia). Water has also proven to be a productive pathway for confidence building, cooperation, and arguably, conflict prevention. Cooperative incidents outnumbered conflicts by more than two to one from 1945-1999 (Wolf, Yoffe, & Giordano, 2003). The key variable is not absolute water scarcity, but the resilience of the institutions that manage water and its associated tensions. In some cases, water provides one of the few paths for dialogue in otherwise heated bilateral conflicts. In politically unsettled regions, water is often essential to regional development negotiations that serve as de facto conflict-prevention strategies. The UN system and its partners have ripe opportunities to capitalize on water's cooperation promise while undercutting its conflict potential.

All the same, in spite of the reason(s), it is fair to say that there is an increasing potential for water crisis and associated conflicts around the world in the future, especially if the current "business-as-usual" attitude continues. Any desire to avoid such potential water crisis and conflicts will require new ways of thinking and implementing water planning and management practices

Water management issues are required in both "hard science" areas (physical science and engineering) and "soft science" areas (social, political, economic and others), beyond what we have been traditionally accustomed to. These will include, among others: (1) new techniques for more accurate assessment of water quantity and quality; (2) new technologies for more efficient water production and saving; (3) new methods for improving water education; (4) new water laws for better sharing of trans-boundary (and other) waters; and (5) new means for addressing the role of social, political, cultural and other aspects of water issues (Sivakumar, 2011). To progress in this direction, a much broader perspective on water is clearly needed, surrounding not only "traditional" water science and engineering but also the social, political, economic,

environmental, technological and human behavioural aspects and interactions among these.

Development of such an integrated framework to address the water issues, as well as communication of outcomes of water studies to different stakeholders in the water sector (i.e. almost everyone), is relevant to future progress.

### **Global Water Conflict**

Over time, conflicts over water, both within countries and outside the countries, are increasing sharply (Table 1). It is noted that a few of these conflicts have led to violence due to the following underlying reasons (1) low rainfall, inadequate water supply, and dependency on one major water source; (2) high population growth and rapid urbanization; (3) modernization and industrialization; and (4) a history of armed combat and poor relations between countries and among groups within countries (Levy & Sidel, 2011). Water scarcity alone, however, is on the odd occasion the cause of armed conflict over water. The actual immediate precipitating causes include socio-political tensions; disputes over dams, reservoirs, and other large-scale projects; and disputes concerning environmental and resource issues.

**TABLE 1**

#### **Global Water Conflicts, 1900–2007**

Time Period in Which Conflict Began	No. Conflicts	Average No./Year	No. Violent Conflicts and Conflicts in the Context of Violence
1900–1959	22	0.37	At least 19
1960–1989	38	1.27	At least 23

Time Period in Which Conflict Began	No. Conflicts	Average No./Year	No. Violent Conflicts and Conflicts in the Context of Violence
1990–2007	83	4.61	At least 61

*Source:* Adapted from Gleick

There are three other Linkages between conflict and water:

**1) Access to adequate water supplies:**

Conflict is most likely to occur over water when disputes involve access to water of adequate quantity and quality. Even when water supplies are not severely limited, allocation of water among different users and uses (urban residents and agriculture, for example) can be highly contested. Besmirched water quality, which can constitute serious threats to health or aggravate scarcity, could create a source of potential violent disputes. Finally, when water supplies for broadly irrigated regions decline either in terms of quantity or quality, those declines can spur migrations that could politically destabilize the receiving cities or neighbouring countries.

**2) Water, livelihood loss, and civil conflict:** Water's importance in sustaining human livelihoods can indirectly link it to conflict. Water is a basic resource for agriculture, which is traditionally the largest source of livelihoods. If this livelihood is no longer available, people are often forced to search for job opportunities in the cities or turn to other, sometimes illicit, ways to make a living. Migration—induced by lack of water, sudden droughts and floods, infrastructure construction (e.g., dams), pollution disasters, or livelihood loss can produce tensions between local and incoming communities, especially when it increases pressure on already scarce resources. And poverty due to livelihood loss has been identified as a common denominator of the causes of conflict in most of the (Ohlsson e civil wars that emerged in Africa, South Asia, and Latin America during the last decade, 2000).

### 3) **Water management and conflict:**

In most cases, it is not the lack of water that leads to conflict, but the inadequate way the resource is governed and managed. There are many reasons why water management fails, including lack of adequate water institutions, inadequate administrative capacity, lack of transparency, ambiguous jurisdictions, overlapping functions, fragmented institutional structures, and lack of necessary infrastructure. Water management is highly complex and extremely political. Balancing competing interests over water allocation and managing water scarcity require strong institutions. A reliable database, including meteorological, hydrological, and socio-economic data, is a fundamental tool for deliberate and farsighted management of water resources.

Yet, reliable information is often difficult to obtain, especially in developing countries. Further, disparities among riparian's capacity to generate, interpret, and legitimize data can lead to mistrust and thus hinder cooperative action. The UN-ECSP report observes that water management in many countries is also characterized by overlapping and competing responsibilities among government bodies. Disaggregated decision-making often produces divergent management approaches that serve contradictory objectives and lead to competing claims from different sectors. And such claims are even more likely to contribute to disputes in countries where there is no formal system of water-use permits, or where enforcement and monitoring are inadequate. Disagreement often arises when management decisions are formulated without adequate consultation and participation by local communities and water users, thus failing to take into account local rights and practices. Protests are particularly likely when the public suspects that water allocations are diverting public resources for private gain or when water use rights are assigned in a secretive and possibly corrupt manner, as demonstrated

by the violent confrontations in 2000 following the privatization of the water utility in Cochabamba, Bolivia (UN-ECSP, 2004).

### **Resolving water conflicts**

It is not shortage or lack of water that leads to conflict (Yoffe, et al., 2003) but issues of water management and governance. To control water use and facilitate sustainable and equitable use in areas suffering with water shortages, stronger policies are required. So far, water management institutions, especially in developing countries, often lack the human, technical and financial resources to develop and implement comprehensive management plans that can properly accomplish the installation of sufficient governing mechanisms (Petersen-Perlman et al., 2017). Parties have to weigh whether the opportunities that may come from entering into a cooperative agreement will outweigh the risk of not cooperating. Some of the categories of risk perceived by decision makers include the following, identified by Subramanian, Brown, & Wolf (2012):

**Capacity and knowledge.** This is when parties fear that they will be at a disadvantage at the negotiating table. The risk manifests in two major ways: (1) parties have a perception of less negotiating capacity than others; or (2) parties have a perception that they do not have accurate information about the shared watercourse.

**Accountability and voice.** Decision makers fear that other basin countries, third parties, or the regional institution may not deliver benefits. Parties perceive that it is highly probable that the proposed institutional arrangement would not result in the flow of benefits, and are concerned that their party's interests would not be adequately considered in joint decision-making processes.

**Sovereignty and autonomy.** This risk involves sensing the danger that a sovereign's authority may be intruded upon in decision-making processes. It addresses both the desire to have control of its development goals, resources and infrastructure, and the right to make independent decisions.

**Equity and access:** Parties are acutely aware of ensuring fairness in any agreement, whether it involves specified water quantities and/or qualities, benefit flows, or project costs. Parties also want to ensure their entitlement to use the watercourse, which could mean the right to continue with historic uses, gaining access to a river that runs through (or originates in) its territory, and/or attaining benefits in proportion to its relative size in (or contribution to) the basin.

**Stability and support.** The Final risk is an important one for all parties, but particularly for those that have diversified and powerful stakeholders. Parties consider the implementability of an agreement based on whether key stakeholders support or oppose the agreement and the positive or negative public image of the decision maker.

In the process of triumphing over these risks, parties involved can start working together towards resolving present conflicts and preventing future ones for a common good. To form thriving transboundary water management team, Blomquist and Ingram (2003) opined that building institutional capital, achieving equity and fairness, and meeting needs that are harmonious with both parties' cultural values. An example of building institutional capacity from a recent water dispute is the Nile River negotiations between Egypt, Ethiopia and Sudan over the Grand Ethiopian Renaissance Dam. To date, the Nile River basin countries have respected the 1959 Nile Waters Treaty, a document formed and amended before many of the Nile Basin countries were independent from colonial rule. The treaty allots 100% of Nile water resources to Egypt and Sudan. Egypt, Ethiopia and Sudan have engaged in a series of negotiations starting in 2013

that most recently resulted in a Declaration of Principles in March 2015. New negotiations can be a reflection the political changes in Egypt and their relationship with upstream, more economically and politically stable countries, such as Ethiopia, as well as economic improvements that the upstream Nile basin countries are experiencing (Veilleux, 2015). She went further to say that “the very act of the ongoing negotiations demonstrates a willingness of historically rival countries to come to the table over shared Nile River water resources. The alternative, conflict, was contained in rhetoric, particularly by the press and politicians, but the choice, cooperation, was demonstrated in action” (Veilleux, 2015).

### **Water Rights and Demands for Water**

The need and scarcity of fresh water is a serious public health concern across the globe that needs to be given a top priority. Inadequate access to safe fresh water contributes to a number of waterborne diseases, malnutrition, and poverty, economic and political instability and possible violent conflicts among countries or groups within a country. Levy and Sidel (2011) note that approximately 97.5% of all water is either salt water or polluted water. The balance 2.5%, about 70% is frozen in glacier and the polar ice caps. Less than 0.01% of all water worldwide is available for human consumption in lakes, rivers, reservoir, and easily assessable aquifers. Approximately three-fifths of water flowing in all rivers is shared by two or more countries in 263 basins in 145 countries, where two-fifths of the World population lives (Wolf, Natharius, Danielson, Ward and Pender, 1999). As a result many countries are highly dependent on water resources that originate from outside their national boundary. Examples are: 34% of water resources in India and 76% of water resources in Pakistan originate from outside the two countries (Renner, 2010). Also, the River Nile Basin is shared by 11 countries that mutually dependent for their water resource needs.



According to World Bank estimates, people generally require 100 – 200 liters of water daily to meet their basic needs (36.5- 73.0<sup>3</sup> of water per person annually). When other uses of water as in agriculture, industry, and energy production, the total annual average requirement of water per person is 1000 cubic meters<sup>3</sup>. In the year 1990, 11 countries in arid or semi arid regions of Africa and the Middle East has less than 1000 cubic meters of fresh water available per person (Gleick, 1993). Looking at the expected increase in population, each of the 11 countries definitely has less water per persons by 2025.

As at now, over one billion people have no access to safe water. This is a problem the World has to face as population grows from 6.8 billion people to approximately 9.0 billion by 2050. This will worse for countries with high rates of population growth that share major freshwater with other countries (Klare, 2001).

## **PREVENTING CONFLICTS OVER WATER**

### **Institutional capacity Building**

Experience has shown that building institutional capacity of the stakeholders, especially those directly involved in the management and governance of the disputed resource can be a successful strategy in resolving and preventing water conflicts. Building institutional capacity, could involve: signing agreements (treaties) and creating river basin organizations, has been described as a tool which can reduce the likelihood of water conflict (Wolf, Stahl, & Macomber, 2003; Yoffe et al., 2004 & 2003). McCaffrey (2003) wrote, “Treaties stabilize the relations of states sharing a river, giving them a certain level of certainty and predictability that is often not present otherwise.” To overcome the risks of cooperation mentioned in the above section, institutions responsible for managing a watercourse’s resources must be strong enough to balance competing interests of allocation and use without prejudice.

Espey & Towfique (2004) note that countries are more likely to sign treaties when they are in conflict with others over management, are dependent on the water resource, and/or have less control over the resource. Riparians who have countervailing economic and political power and share 'Western civilization' characteristics are also much more likely to sign treaties (Song & Whittington, 2004).

According to Petersen-Perlman et al. (2017) institutions may also need to manage human-induced water scarcity. Because of the possible contentiousness surrounding these decisions related to managing water scarcity, institutions (and their structural makeup) can themselves become central settings for disputes. International water conflicts may happen when there is no institution that delineates each nation's rights and responsibilities with regard to the shared body of water, nor any agreements or implicit cooperative arrangements. The sheer presence of institutional capacity does not signify its effectiveness; in an analysis involving 153 water-related agreements in Africa identified by Lautze and Giordano (2005), only 108 were considered substantive, and many of these either were never implemented in practice or are no longer enforced. For these agreements to be considered substantive, they need to have characteristics that are operative in preventing conflicts. Ambiguity (intentional or not) in agreements may prove to increase the agreement's resilience towards conflict by allowing each side to present the treaty differently at home to defuse domestic opposition and/or providing leeway to adjust allocations during crises (Fischhendler, 2008). Other characteristics that make institutional capacity effective for preventing water conflict include:

- an adaptable management structure (including flexibility, allowing for public input, changing basin priorities, and new information and monitoring technologies)
- clear and flexible allocating criteria among riparian's

- equitable distribution of benefits
- detailed conflict-resolution mechanisms (Giordano & Wolf, 2003).

Other number of approaches can prevent conflicts over water. A set of approaches consists of measures to increase the availability of water, including (1) reducing use of water, by decreasing wasteful uses and increasing efficient uses; (2) increasing availability of clean water, by reducing industrial pollution and sewage contamination of water, improving sewage and wastewater treatment, and improving watershed management; (3) establishing and maintaining new groundwater wells; (4) designing and implementing improved methods of desalinization; and (5) expanding use of greywater (wastewater from domestic activities that can be recycled for some uses), as has been done extensively in Singapore and Israel.

Another set of approaches aims to resolve conflicts over water before they boil over—that is, before they become violent or have other serious consequences. Such preventive measures include (1) laws and regulations at the local, state or provincial, national, or international level; (2) proactive cooperation among nations or among states or provinces within nations; and (3) mediation and arbitration. Internationally, there have been more than 3800 unilateral, bilateral, or multilateral declarations or conventions concerning water, including 286 treaties (UN, undated) In addition, throughout the world there have been numerous laws and regulations concerning water use at the local, state or provincial, and national levels. Much needs to be done to strengthen the enforcement of existing laws and regulations and to develop new ones to address current issues (Levy et al., 2011).

Proactive cooperation can help resolve conflicts over water and help maintain public health, food security, and social, environmental, and economic stability. It can also help prevent violent conflict over water and help build sustainable peace. Two examples of such cooperation in the

Middle East have been the Good Water Neighbours Project and the Nile Basin Initiative. The Good Water Neighbours Project, established in 2001, has brought together Israeli, Jordanian, and Palestinian communities to protect shared water resources and has significantly improved the local water sector and helped to build peace at the local level (Kramer, 2008). The Nile Basin Initiative, which began in 1999, is an international venture in which nine countries have developed the Nile in a cooperative manner, shared substantial socioeconomic benefits, and promoted regional peace and security (Nile Basin, undated).

Much cooperation over water use also exists in other parts of the world. For example, the Autonomous Water Authority created by Bolivia and Peru, which share Lake Titicaca, has enabled these countries to work together on the management of water resources (Delli, 2009). Another excellent example of cooperative water use can be found by examining the situation of the freshwater basin of the Aral Sea, which is shared by six countries. The surface of the sea had shrunk between the 1960s and 2007 to 10% of its original size by diversion of water, which drained two rivers feeding it and devastated the environment. With the completion of the Kok-Aral Dam, the Aral Sea has now begun to fill again (World Bank, Undated).

While men make most of the decisions about water policy, the role of women is often inappropriately neglected. Women are the gatherers of water in most developing countries and make most of the decisions about its use for drinking and for personal sanitation. Women are also involved in 70% of food production in developing countries, and, although food production is a major use of water, women have little voice in this aspect of water policy. The targets of Millennium Development Goal (MDG) 3 (promote gender equality and empower women) are far from being achieved (Levy, et al., 2011).

Despite the great challenges to peace that are posed by current and imminent conflicts over water, there is reason for hope that these dangers can be transformed into opportunities. As the United Nations has stated:

Despite widespread perceptions that water basins shared by countries tend to engender hostility rather than collaborative solutions, water is an often untapped resource of fruitful cooperation.

### **Working to enhance Cooperation**

Water remains a powerfully unifying resource, central to human life and our ecosystem, its management is generally diffused among the world's agencies and institutions. The UN has water-related expertise spread throughout the system, including such other bodies as UN Development Programme (UNDP), UN Environment Programme (UNEP), United Nations Educational, Scientific, and Cultural Organization (UNESCO), United Nations Children's Fund (UNICEF), Food and Agriculture Organization (FAO), and the UN Economic Commissions, along with partners like the World Bank and the Global Environment Facility. The spread of these diverse but impressive expertises has in the past prevented the UN from taking the lead in water-related conflict mitigation. To resolve this problem, the UN system must integrate policy and coordinate its extensive but disperse expertise on water, conflict, and cooperation across its bodies.

International waters: The UN should develop an integrated, systematic programme of preventive water diplomacy based on modified versions of the World Bank and Global Environment Facility frameworks. The programme is expected to:

- 1) Bolster early warning for regions with potential for water conflicts (conducted by, for example, UNEP's Division of Early Warning and Assessment);

- 2) Develop a systematic program for enhancing institutional capacity between nations, including reconciling national legal frameworks (perhaps led by FAO's Development Law Service); and
- 3) Craft, by unifying existing expertise, a "one-stop shop" for developing programs to enhance cooperation (such as UNESCO's recently launched Water Cooperation Facility). All these efforts should integrate traditional conflict-prevention bodies, such as UNDP's Bureau for Crisis Prevention and Recovery, in both the design and use of these products and capacities (UN-ECSP, 2004).

The UN-ECSP report (2004) observed that the UN must address a number of gaps that impede the implementation of this systematic, integrated programme. First, only a small number of experienced water-dispute facilitators are viewed as truly neutral. The World Bank has a few, but they are in short supply at other UN bodies. It is therefore expected that the "UN system should rebuild its ability by recruiting and training facilitators in hydrology, international law, regional history, and conflict prevention (the Universities Partnership for Transboundary Waters offers a model for developing and executing this training).

Second, UN conveners and facilitators, and their bilateral funders, must be willing to support long processes without requiring instant or easily measurable results. The World Bank's 20-year commitment to the NBI is an exemplary model, which the bank is reproducing in other African basins.

The UN should extend this model beyond Africa and encourage disparate UN bodies to cooperate as equal partners.

Third, to achieve sustainable implementation, the UN must find ways to include all stakeholders throughout the process, in order to offset the secrecy that traditionally surrounds high-level

negotiations. Unlike the NBI, this should not wait until state-to-state agreements have been reached.

Finally, the UN should seek to strengthen the capacity of parties to negotiate contested water issues. Disparities in capacity and knowledge have often led to mistrust between riparian countries, hindering cooperative action”.

As Biswas & Tortajada (2019) succinctly noted that “the fact is that in the entirety of human history, no two countries have ever gone to war over water”. And further aver that the price of water all over the world is very low, and there is no global market or trade for water, unless one considers bottled water, which represents a miniscule fraction of global water use. All countries are steadily realizing that they have to significantly improve their management practices to reduce the demand for all types of water uses and to control water contamination. No country can increase water availability progressively, constantly and cost-effectively *ad infinitum*.

If countries make determined and sustained efforts to improve water management practices, and there are signs that some are gradually doing so, their water problems can be solved. As Biswas (2006) noted in his Stockholm Water Prize Lecture, ‘ if ever there is a war between two countries, it will never be because of water. Perhaps the 10th or 15th reason for the war could be water, but not the first three’. In the future, countries will have to manage their water significantly better, because they will have no other choice. ‘ Water wars’ is a myth that has been around for at least four decades. There are no signs that they will occur in the foreseeable future anywhere in the world.

## **Conclusion**

By establishing a programme of preventive diplomacy focused on water, the UN could coordinate its extensive but diffuse expertise in a programme that would assess basins at risk and

bolster the early-warning process for regions with conflict potential. Such programme would also enhance institutional capacity between nations through reconciliation of national legal frameworks over water issues, by developing expertise, a “one-stop shop” with tools to develop programmes that encourage transboundary cooperation. The UN could work out through a Global Fund for Water, with special emphasis on understanding the Southern perspective and integrating conflict prevention units that could improve water management and facilitation skills, reduce duplicate efforts, and use water to build confidence and prevent conflict

In a transboundary basin users interconnected and every downstream user has the potential to be affected by events occurring upstream of them. To a lesser extent, upstream users are also interconnected with their downstream counterparts through downstream demands and actions. It is significant to note that not all cooperative frameworks are perfect or just for all parties involved, but given a list of alternatives that includes violence, cooperation might be a preferred option. This very inter-connectedness strengthens the case for the need for cooperative frameworks to manage transboundary water for common interests.

No doubt, new challenges in managing transboundary water will definitely emerge, particularly with the dawn of increased variability resulting from climate change and the expanding globalized economy. As a guide, parties must participate in conflict-resolution approaches and invest in institutional capacity with their neighbours so that a systemic, holistic water management can provide the opportunity for more users to meet their basic needs and become economically resilient thereby increasing water security.



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