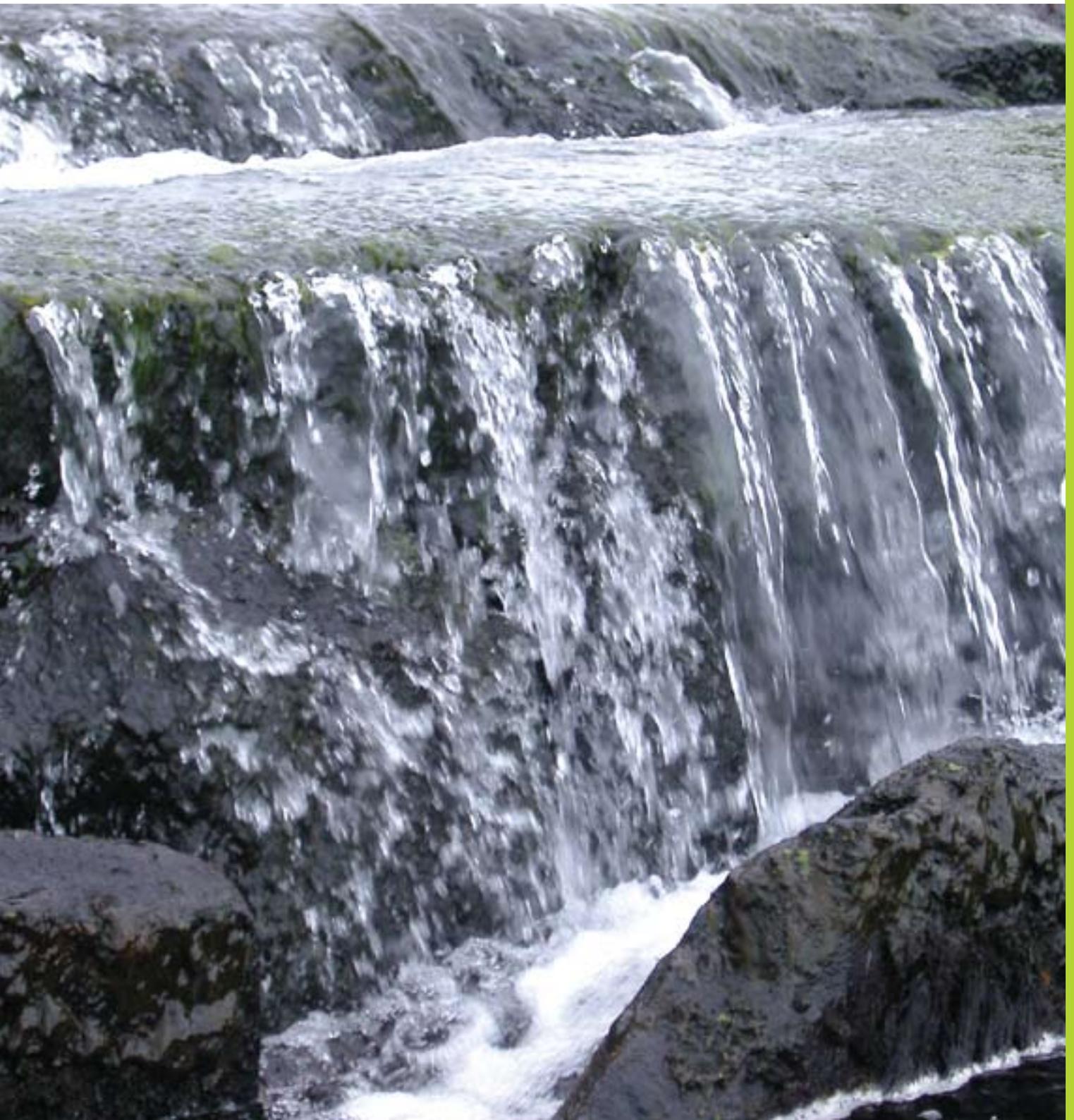


Trans-Boundary Water Resources

RAYA MARINA STEPHAN



I. INTRODUCTION

The Arab region is one of the most water scarce regions in the world. Of all renewable water resources in the region, two thirds originate from sources outside the region (El-Quosy, 2009). Surface and underground water resources are shared among countries within the region and with countries from outside the region. Three rivers, namely, the Nile, the Tigris, and the Euphrates account for the majority of the region's surface water. All three rivers are shared amongst more than two riparian countries. Other shared surface waters include the Jordan River, the Nahr Al-Kabir, and the Orontes.

The Arab region relies also heavily on groundwater which is found in a number of shared' aquifers such as the basalt aquifer shared by Jordan and Syria, the Palaeogene aquifer shared by Oman and the United Arab Emirates, the Disi sandstone aquifer shared by Jordan and Saudi Arabia, and the Nubian Sandstone Aquifer System (NSAS) shared by Chad, Egypt, Libya, and Sudan. As with surface water, the major aquifers in the region are shared between two or more countries. In fact, the majority of territorially contiguous states in the Middle East and North Africa share both renewable or nonrenewable groundwater aquifers.

It is therefore recognized that most Arab states depend for their water supply on rivers and/or aquifers that are shared with neighboring countries. As shared surface water resources are becoming increasingly exhausted, in terms of quantity and/or quality, there is more and more reliance on shared groundwater resources, leading to their over-exploitation. A major challenge is thus confronting the region. Undisputedly, the sustainable management of a shared water body has to involve all riparian countries. Cooperation in managing shared water resources in a water scarce region is imperative in order to ensure resource preservation and its sustainable development. The region already experiences some cooperation modalities, some formalized by inter-state agreements, some less formally set up through technical committees, experts meetings, or joint projects. However, numerous shared water basins are still managed in a unilateral manner by the concerned states, without any cooperative effort. Even where cooperative modalities exist



in exchanging data and developing models and information systems, actual joint management of the shared water systems has not taken root yet. Therefore, much effort still needs to be exerted before the region's shared water resources can be beneficially used sustainably, equitably, and in accordance with the principles of international water law. This paper will give an overview of the current situation regarding shared waters in the Arab region, and will address pathways for creating sustainable cooperation agreements on shared waters.

II. CURRENT SITUATION

Cooperation modalities over shared waters are not totally absent in the Arab region. On some basins (surface or groundwater) formal inter-state agreements exist, with a more or less developed cooperation.

A. Existing agreements

Some 263 surface water basins in the world are shared between two or more countries, with numerous existing agreements on these basins. The number of transboundary aquifers identified worldwide as of today is around 270, although the exact number is not yet completely established (UNESCO, 2009). However, the number of treaties on such

aquifers is very limited. While there is only one comprehensive agreement on the management of a transboundary aquifer², there are very few others and only with a more limited scope. Two are found in the Arab region.

1. Agreements on shared surface waters

Lebanon and Syria have signed two agreements on their shared rivers. These are the agreements on the Orontes signed in 1994 and the one on the Nahr Al-Kabir Al Janoubi signed in 2002.

a. The agreement on the Orontes

The Orontes is a shared river making its source in Lebanon, flowing into Syria, and ending in Turkey. Lebanon and Syria have signed in 1994 the Accord Concerning the Distribution of the Orontes. The agreement does not involve Turkey. Negotiations between Syria and Turkey did not lead to any result. An annex was added to the Syrian-Lebanese agreement in 1997, which was ratified only in 2001 by the Syrian-Lebanese Higher Council. Under this agreement, a dam was built in Lebanon on the Orontes with a capacity of 37 million m³ (ESCWA, 2006).

b. The agreement on the Nahr Al-Kabir al Janoubi

The Nahr Al-Kabir Al Janoubi forms Lebanon's northern border with the Syrian Arab Republic. The total river watershed area is about 990 km², of which 295 km² lies in Lebanon (ESCWA, 2006). Discussions between Lebanon and Syria on sharing the waters of the Al-Kabir Al Janoubi river began as discussions on sharing the waters of the Orontes were progressing. An agreement was reached in 2002. The agreement draws on principles from the UN Convention on the Non-Navigational Uses of International Watercourses (May 21, 1997), which both Lebanon and Syria have ratified.³ Its main provisions are based on the articles of this Convention. The focus of the agreement is the fair and optimal distribution of waters of the Nahr Al-Kabir Al Janoubi and it is based on the principle of realizing mutual benefit for the two sides. The agreement has also established a process of cooperation between the two countries through a joint committee to share information and results. Based on identified needs and requirements for both countries in all

sectors (potable, irrigation, and industrial), the construction of a joint dam⁴ in the location of Idlin (Syria) – Noura al-Tahta (Lebanon) was decided, with a storage capacity of 70 million m³, according to technical and economic feasibility studies (ESCWA, 2006).

The agreement is considered to have established a good basis for cooperation between Lebanon and Syria. However, implementation of the agreement seems to have been held up due to financial, administrative, and political problems (ESCWA, 2006).

c. Agreement on the Yarmouk

The building of a dam, with a hydropower station, was also the purpose of the agreement between Jordan and Syria on the Yarmouk river, the main tributary of the Jordan river. A first agreement was signed in 1953, but it was not implemented and was updated and replaced by a second agreement in 1987. In the second agreement, Jordan and Syria agreed to “build the Unity Dam on the Yarmouk River with a height of 100 m and a storage capacity of 225 million m³. In 2003, the height of the dam was reduced to 87 m and the storage capacity became 110 million m³” (FAO, 2008). The dam was finally inaugurated in 2008. Because of the political conflict in the region, the case of the Yarmouk cannot be considered completely settled so far. The river is part of the Jordan River basin. It needs therefore to be integrated into an agreement governing the whole drainage basin.

2. Agreements on shared aquifers

As mentioned earlier, the Arab region relies significantly on groundwater resources, which are found mostly in aquifer systems underlying the territories of two or more states. Some of these aquifers are large systems, such as the systems in the Arabian Peninsula. The North Western Sahara Aquifer System (NWSAS) and the Nubian Sandstone Aquifer system (NSAS) are even larger. The riparian states of the NWSAS and NSAS aquifer systems have entered into respective agreements among themselves on the joint management of these shared aquifer resources. These agreements are part of the very few agreements worldwide on a shared aquifer.

a. Agreement on the Nubian Sandstone Aquifer System

The Nubian sandstone aquifer system (NSAS), extending over more than 2 million square kilometers, is one of the largest aquifer systems in the world and extends into eastern Libya, Egypt, northeastern Chad, and northern Sudan. Consisting of a number of aquifers that are horizontally and/or vertically connected, “the Nubian aquifer is a strategically crucial regional resource in this arid region, which has only few alternative freshwater resources, a low and irregular rainfall, and persistent drought and is subject to land degradation and desertification. Under current climatic conditions, the Nubian aquifer represents a finite, non-renewable groundwater resource” (Yamada, 2004).

In July 1992, Egypt and Libya signed an agreement on the ‘Constitution of the Joint Authority for the study and development of the Nubian Sandstone Aquifer Waters’, which both Chad and Sudan joined subsequently. “The Joint Authority is responsible for collecting and updating data, conducting studies, formulating plans and programs for water resources development and utilization, implementing common groundwater management policies, training technical personnel, rationing the aquifer water, and studying the environmental aspects of water resources development” (Yamada, 2004). However, the Joint Authority has not properly and completely fulfilled its mandate so far.

b. Cooperation on the North Western Sahara Aquifer System

The North Western Sahara Aquifer System (NWSAS), as shown in Figure 1, is shared between Algeria, Libya, and Tunisia and covers an area of more than 1 million km² (700,000 km² in Algeria, 80,000 km² in Tunisia, and 250,000 km² in Libya) (OSS, 2008). The system represents the only perennial source of water for about 5 million inhabitants. Its total theoretical reserves are estimated at 60 million km³.

Scientific characterization studies of the NWSAS had started in the 1960s, and developed in 1980 mainly between Algeria and Tunisia. Libya joined later. Bilateral commissions were established such as the technical committee on water and environment between Algeria and

Tunisia (in the 1980s), the technical committee on water resources between Algeria and Libya (in the 1990s), and the sectoral commission between Tunisia and Libya on agriculture (in the 1990s) (OSS, 2008). In 1998, the three countries launched a joint project with a provision for the establishment of a concertation mechanism.

A first temporary mechanism among the three countries was set up in 2002. Its main task was the management of the database and the regular updating of the aquifer system model. This mechanism evolved towards a permanent structure in 2008. As illustrated in Figure 2, the mechanism is composed of:

- A Council of Ministers in charge of water resources in the three countries;
- A Steering Committee composed of the national institutions in charge of water resources in the three countries;
- National Committees including other institutions concerned with water resources, users associations, and non-governmental organizations (NGOs);
- National and regional working groups composed of engineers and technicians; and
- A coordination unit led by a coordinator at the Tunis-based Sahara and Sahel Observatory.⁵

The role of the coordination mechanism is to offer a framework for exchange and cooperation among the three countries by:

- Measuring water resources indicators and water demand;
- Elaborating management scenarios for the development of the basin;
- Enforcing and updating the common database by the exchange of data and information; and
- Developing and managing common monitoring networks of the aquifer system.

c. The Special Case of Shared Water in the Peace Process Agreements

The two agreements of concern here are the 1994 Treaty of Peace Between the State of Israel and the Hashemite Kingdom of Jordan and the 1995 Interim Agreement on the West Bank and the Gaza Strip or Oslo II. These two agreements

FIGURE 1 THE NORTH WESTERN SAHARA AQUIFER (NWSAS) FORMATION SYSTEM



do contain provisions on shared water resources, strongly linked to a context of political conflict and exercise of power.

The agreement between Israel and Jordan includes an annex II on “Water related matters” covering the Yarmouk River, the Jordan River, and groundwater in Wadi Araba. The Jordan River is shared among five riparian countries: Israel, Jordan, Lebanon, Syria, and the Palestinian Territories. The agreement is between only two of these riparians, Israel and Jordan, not leading however to any joint management of the Jordan River. Rather the annex is concerned with the allocation of water between the two signatories. It is also worth adding that so far the right of access to the Palestinians to the Jordan River is not recognized.

Article 40 of Protocol III of the Oslo II agreement deals with water issues between Israel and the Palestinian Territories concerning, for example, use of the Mountain Aquifers. While it seems to recognize Palestinian water rights, the Oslo II agreement maintains the policy applied under the military occupation, legalizing Israeli control over the shared water resources.

It remains clear that in the absence of a political settlement of the conflict between Israel and its neighbors, control over shared water resources will continue to reflect the balance of power relations in the region, as these two agreements patently illustrate, and cooperative endeavors for joint management will continue to be blocked.

B. Other initiatives and attempts for cooperation

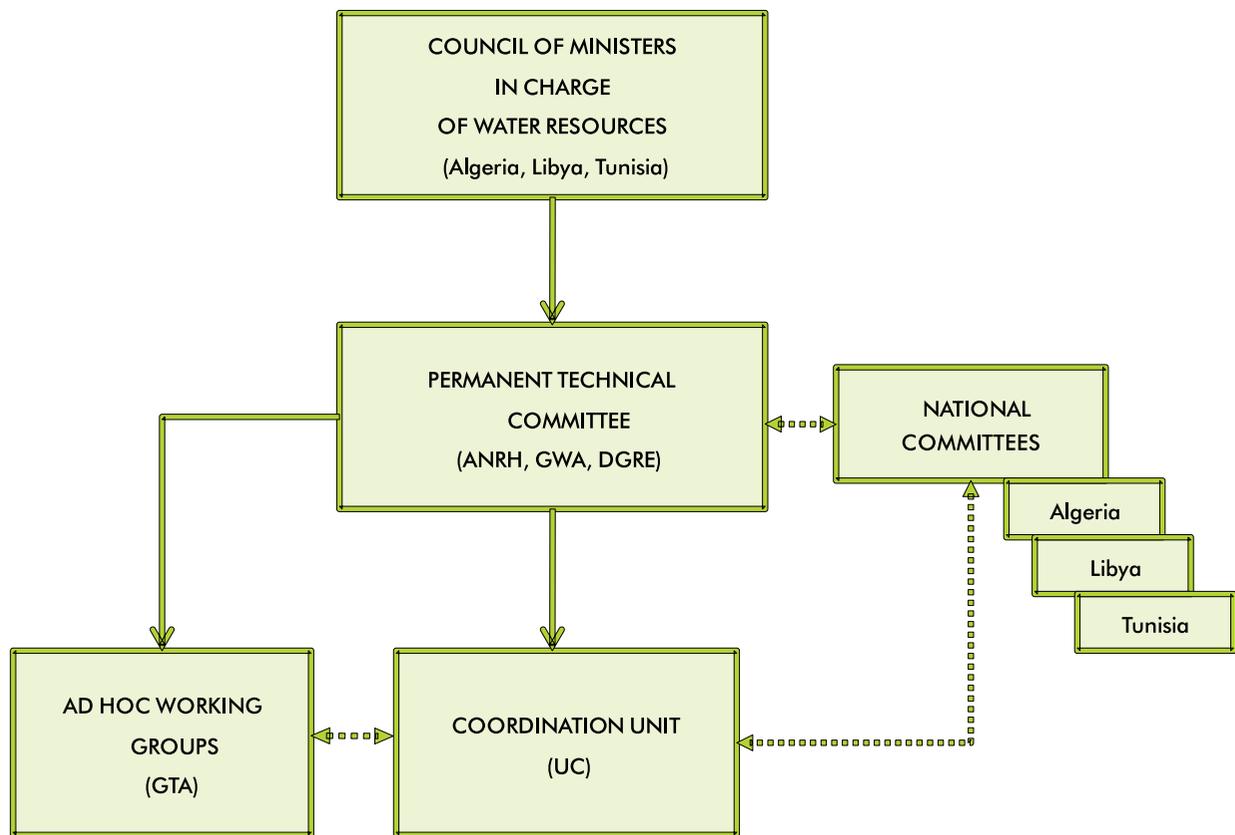
The aim of the first part of this overview was to describe the current situation of shared water resources in the Arab region and present cases where cooperation was formalized by an agreement. The next section will focus on basins where initiatives are undergoing in order to bring the riparian states to cooperate.

a. The Euphrates and Tigris

Although bilateral agreements, treaties of friendships, joint technical committee meetings, and protocols have existed for the cooperative management of the Tigris and Euphrates river basin, the three countries, Turkey, Syria, and Iraq, have failed so far to reach a far-reaching agreement or framework particularly “as

FIGURE 2

STRUCTURE OF THE PERMANENT CONSULTATION MECHANISM OF THE NWSAS



Structure of the permanent consultation mechanism of the SASS
(Latrech, oral presentation, Tripoli 2008)

Notes:

ANRH = Agence Nationale des Ressources Hydrauliques (Algeria)
GWA = General Water Authority (Libya)

DGRE = Direction générale des Ressources en Eau (Tunisia)
GTA = Groupes de Travail ad hoc
UC = Unité de Coordination

Source: Latrech, 2008

a result of conflict over the development of Turkey's Southeastern Anatolia Project and the filling of the Ataturk Dam" (ESCWA, 2009). The situation remains tense in this two-river basin as Turkey has pursued its unilateral GAP project. There is plenty of blame to go around, however. In fact, "the Euphrates is so choked by Turkish, Syrian, and Iraqi dams that the river-end residents of Basra must reach hundreds of kilometers back upstream for their supply" (Zeitoun, 2010).

b. The Nile River

The Nile River, the longest river in the world, has two major tributaries: the Blue Nile and the White

Nile. The White Nile originates in Lake Victoria in east central Africa, and flows north through Uganda and into Sudan where it meets the Blue Nile, which rises in the Ethiopian highlands. The Blue Nile is the source of the majority (85%) of the Nile's River water. From the confluence of the White and the Blue Nile, the river continues to flow northwards into Egypt where it forms a delta before reaching the Mediterranean. Egypt gets 97 percent of its water from the Nile River. Sudan receives substantial amount from both the Blue Nile and the White Nile before they join near Khartoum.

The Nile Basin Initiative⁶ (NBI), launched in

THE NILE BASIN INITIATIVE

The Nile Basin Initiative (NBI) is a good model to learn about the benefits and risks of joint management of shared water resources. It is led by the council of ministers of water affairs of the ten countries sharing the Nile Basin⁷. The Initiative's strategic action program is guided by a shared vision to develop the basin through equitable utilization of the Nile Basin water resources. The Initiative includes a basin wide program for technical assistance, and sub basin investment programs to curb poverty, promote growth, and improve environmental management. The Nile Basin Initiative (NBI) was launched in 1999. It provided an agreed basin-wide framework to fight poverty and promote economic development in the region. A draft text of cooperative framework was produced in early 2000. The immediate objective is to attain a regional cooperative framework acceptable to all Basin countries to promote basin-wide cooperation in integrated water resources planning and management. The NBI is comprised of a council of ministers of water affairs of the Nile Basin (Nile-COM), a technical Advisory Committee (Nile-TAC), and a secretariat (Nile-SEC) located in Entebbe. The basin-wide shared vision program includes seven projects. Four of these are thematic in nature, addressing issues related to environmental management, power

trade, efficient water use in agriculture, and water resources planning and management. The remaining three are facilitative, supporting effort to strengthen confidence building and stakeholders' involvement, applied training, and socio-economic development and benefit-sharing. Two subsidiary action programs were developed: The Eastern Nile currently includes Egypt, Sudan, and Ethiopia; and the Nile Equatorial Lakes Region includes six countries in the southern portion of the basin as well as the downstream riparian Sudan and Egypt. These subsidiary groups have identified joint investment opportunities, which warrant further investigation and preparation. An international consortium for cooperation on the Nile has been established to support the NBI action program.

Recent meetings among the riparian countries have not produced tangible progress in three areas: protection of the historical share of the Nile water for the downstream countries, governance, and the decision making process where the parties did not agree on the proposed unanimous agreement for decision making especially in approving investment operations in the basin.

Shawki Barghouti

1999, has brought together the ten riparian countries of the Nile (Egypt, the Sudan, Burundi, Democratic Republic of Congo, Eritrea (observer), Ethiopia, Kenya, Rwanda, Tanzania, and Uganda). The objectives of the initiative are to develop the river in a cooperative manner, share substantial socioeconomic benefits, and promote regional peace and security. Under this initiative, a Cooperative Framework Agreement (CFA) was prepared. Despite the strong opposition of Egypt and Sudan, which claim historic rights on the Nile waters, the Agreement was opened for signature on May 14, 2010, for a period of one year during a ceremony held at Entebbe, Uganda. Five states have already signed it: Ethiopia, Kenya, Rwanda, Tanzania, and Uganda. Burundi and the Democratic republic of Congo are expected to sign the new agreement. The new Cooperative Framework Agreement is influenced by the UN Convention on the Law of Non-navigational Uses of International Watercourses. The CFA does not include any figures about water sharing. It establishes a framework for cooperation among the Nile River Basin states (Le Monde, 2010).

The CFA will formalize the transformation of the Nile Basin Initiative into a permanent Nile River Basin Commission, which will manage water resources on behalf of all the Nile Basin states. The new agreement promises a win-win outcome and benefits for the Nile Basin states. It is expected that the agreement will ensure sustainable development of the shared Nile water resources. The CFA necessitates six ratifications to enter into force. While both Egypt and Sudan have dismissed the CFA, stating that they will not sign it and that it is not a binding treaty, they have nonetheless engaged in diplomatic efforts and dialogue in the region since the signing of the agreement.

III. THE WAY FORWARD

The first part of this paper has presented a general overview⁸ of the current situation in some shared surface and groundwater basins in the Arab region. There are other river basins in the Arab region that have not been discussed. In the majority of

these basins, no joint management action has been taken, leaving the riparian countries to make their own use of shared water resources without any consultation among themselves. However there are possibilities in establishing cooperation and for improving existing agreements that can bring about long-term mutual benefits of water use to all riparian countries.

A. Achievements and results: Lessons learnt

Cooperation on the North Western Sahara Aquifer System (NWSAS) represents today the most achieved one in the Arab region. The emergence of the first signs of deterioration in the state of the aquifer system prompted the three sharing countries, Tunisia, Algeria, and Libya, to launch the first joint project on the aquifer system. Signs of trouble included “increased potential for conflict among countries, water salinization, disappearance of artesian flow well drilling, outlets drying up, and excessive drawdown in pumping wells” (Mamou et al., 2006). These signs of decline have resulted from the continued over-exploitation of the aquifer system by the three countries. While the countries had previously cooperated on issues related to the aquifer system, cooperation had remained bilateral as mentioned earlier. Recognition of impending increased risks affecting the aquifer system has brought the three countries together. The first phase of the project (1998-2002)⁹ included studying the hydrogeology of the aquifer, setting up an information database system, developing mathematical models, and establishing a consultation mechanism, and had generated as an outcome “a database containing all present and historical information on all water points, their levels, and their flows” (Mamou et al., 2006). The database as well as the mathematical model of the aquifer system are accessible to all three countries.

Prior to the joint project, there existed two parallel concepts of Saharan hydrogeology resulting from earlier isolated studies:

- A model on the Algerian-Tunisian side treating the two parts of the system separately and designing them as single independent aquifer layers; and
- A model on the Libyan side, adopting a multilayer structure.

The joint project however has succeeded in elaborating a common model ensuring the best simulation conditions and giving a global picture of the system. The database was built with the information provided by the three countries requiring an enormous work of harmonization and adaptation, resulting in a common base compatible with the individual databases of the three countries (Mamou, et al., 2006).

The first responsibility of the temporary consultation mechanism established in 2002 was to guarantee the maintenance, development, and the permanent updating of these tools and to allow the regular exchange of data (OSS, 2008). The sense of partnership developed during the project has contributed to building confidence among the technical teams and has created a recognition that water problems encountered by one country are most probably the result of individual actions. Ultimately, there developed a conviction that common actions contribute to better results and increased efficiency and a strong belief that information exchange is a necessity (Mamou et al., 2006).

The above example is very informative and highlights important factors necessary in developing cooperation:

- Identification of the national entities in charge of data collecting and documentation with the participation of national experts was highly important. More critically, sharing of data by all three countries and the development of scientific knowledge of the system was indispensable;
- Involvement of national experts in all phases of the project was vital.

In the case of the NWSAS, cooperation was built step by step and was based on scientific cooperation that had been previously developed among the riparian countries in order to improve knowledge about the aquifer system. Rather than building formal and heavy joint institutions at the outset, there was an orientation towards establishing a flexible joint institutional setting that has evolved to a permanent structure. The regional organization, the Sahara and Sahel Observatory (OSS), played a central role, notably by hosting the database and the consultation

mechanism (OSS, 2008). However, the results produced by the common database and from the model are utilized by each country individually for water use planning purposes. A more integrated and collective management of the aquifer system still eludes the three countries. Recognizing the significance of data sharing and joint technical projects, it is hoped that water institutions in the three countries would build up on current achievements and move beyond conducting joint scientific studies to managing the entire aquifer system collectively. It would be highly desirable therefore to develop a cooperation mechanism towards common decision-making and joint management and investment of water resources in the NWSAS aquifer system. Only then will the social, economic, and environmental needs of the region be fully provided for.

While the Nile Basin Initiative (NBI) seems to be at an uncertain turning point, it has nevertheless introduced a change in the landscape of the Nile River. For decades, the river had been dominated by Egypt and Sudan basing their arguments on two agreements from 1929 and 1959, which gave them preferential rights on the River Nile waters. The NBI has brought together for the first time all the riparian countries of the river. Even if the fate of the new Cooperative Framework Agreement (CFA) seems unsure yet, many believe that the status quo is no longer tenable and therefore it is more sensible to view questions of water sharing as evolving. The merit of the NBI is to have started a mechanism of consultations and to have created an irreversible process where all riparian countries are involved. It is now prudent for all Nile basin countries to draw on principles from the UN Convention on the Non-Navigational Uses of International Watercourses to continue to find an equitable and sustainable formula for sharing the waters of the Nile. It is noteworthy that national diplomats and ministers of foreign affairs, rather than water ministers, have been involved in the most recent rounds of negotiating the CFA, reflecting the high and strategic profile attached by Nile riparian countries to any future arrangements concerning share use and management of the river water.

Cases from other regions may provide models for emulation. In the case of the Danube River, cooperation among the riparian states had been going on for a long time because of river

navigation. However, in 1991 the Environmental Program for the Danube River Basin (EPDRB) was initiated. Under this initiative a Strategic Action Plan (SAP) was prepared, and it was agreed for SAP to be the tool for implementing the Danube River Protection (1994). The EPDRB has closely been linked with the development of the agreement (ICPDR, 2006).¹⁰

B. Developing cooperation modalities

Developing cooperation modalities in the Arab region can be accomplished. A key issue is to take a practical, step-by-step approach, and to persist in conducting long-term joint cooperation projects and in implementing provisions of current agreements.

1. Building on and reviving existing agreements

As mentioned in Part I, agreements are already in place for some shared basins, however their implementation has been held up. Such agreements and the mechanisms they have established should be the starting point for reviving cooperation in a constructive manner.

The case of the Nahr Al-Kabir has been earlier developed. The agreement on the Nahr Al-Kabir had seemed promising when it was signed and has been held as a model for concluding shared water agreements successfully by employing provisions derived from the relevant United Nations Conventions and resolutions. However, implementation of the agreement has been mired in administrative and financial problems (ESCWA, 2006). The agreement may also have fallen victim to the ebbs and flows in the state of political relations between the two countries over the years. A first step would be the revival of the joint committee, which represents the mechanism of cooperation between the two countries. The joint committee should be allowed to play its role by providing it with the mandate and the resources needed to execute provisions of the agreement.

Another issue for consideration in this basin is groundwater, which has not been addressed by the agreement. The Nahr Al-Kabir basin is very rich in groundwater due to the high average rate of precipitation. Moreover, the basin geology

is conducive to the formation of aquifers. The sustainability of water resources in the basin requires adequate attention and monitoring of both surface and groundwater through a joint management arrangement. The hydrological monitoring needs of the basin were identified so far to include mainly the quality of the surface water and the quantity and quality of the groundwater (Drouby, 2008).

Another example of cooperation where no formal agreement exists is the case of the Basalt aquifer between Jordan and Syria. A joint study was initiated by ESCWA on this aquifer in 1994, working with the respective water authorities in both countries. In view of pursuing and enhancing the cooperation and coordination between the two countries, a memorandum of understanding (MOU) was prepared in 2002 but it was never signed (ESCWA, 2006). Today the text of the MOU might need revision, and the study might need to be updated.

2. Regionally: Building on results of various meetings/projects on shared waters

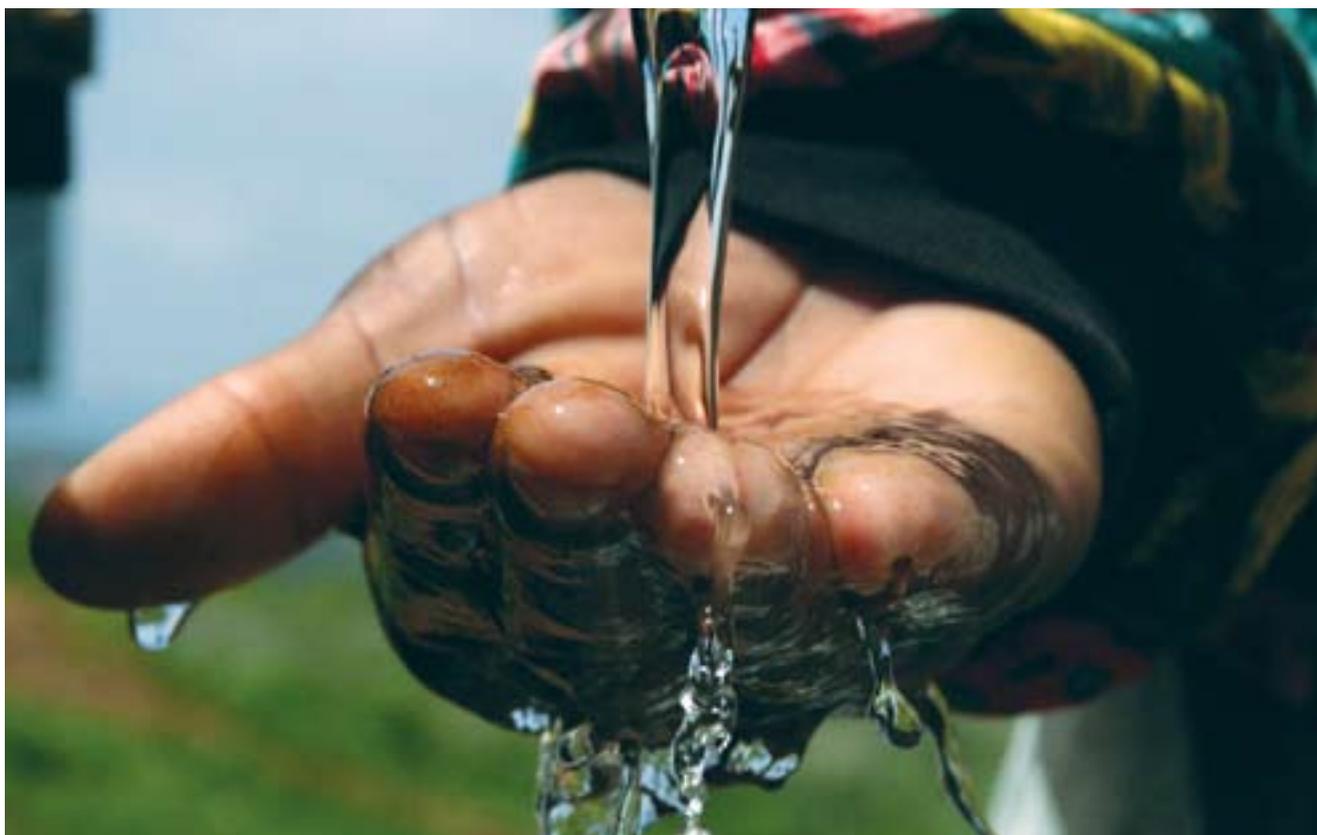
At the initiative of regional organizations such as the Economic and Social Commission for Western Asia (ESCWA), Sahara and Sahel Observatory (OSS), and others, various workshop meetings, projects, and training seminars on shared water resources have been held. These initiatives have brought water experts representing government Ministry officials in charge of water resources in Arab countries together with international and Arab experts from outside the region. These meetings and projects have produced recommendations and frameworks, which could be considered for bringing the issues of shared water management high on the agenda. ESCWA has itself held meetings and training related to the topic such as the 'Workshop on Legal Framework for Shared Groundwater Development and Management in the ESCWA Region (2003)', and the 'Workshop on Training of Trainers on the Application of IWRM Guidelines in the Arab Region (2005)', which included a module on the 'Management of the shared water resources in the region'.

ESCWA had coordinated in partnership with the Economic Commission for Europe (ECE),

the Economic Commission for Africa (ECA), and UNESCO's International Hydrology Program (IHP) the project 'Capacity Building for Sustainable Utilization, Management, and Protection of Internationally Shared Groundwater in the Mediterranean Region'. The project covered only the Mediterranean countries of ESCWA, but the intention was to extend its result to other countries, which were invited to participate in the last workshops. The main objective of the project was to increase awareness and application by the MEDA countries of the international norms in the sustainable management of shared aquifers. A major outcome of the project was the production of guidelines and a policy framework for the management of shared groundwater in the MEDA region. On December 1-3, 2009, ESCWA has organized in Beirut an Experts Group Meeting in cooperation with BGR (German Geological Survey) on 'Applying IWRM Principles in Managing Shared Water Resources: Towards a Regional Vision'. The objectives of the meeting¹¹ were to:

- Provide a forum for discussions on the linkages between international water law principles and IWRM principles within a regional context;
- Identify on-going and planned initiatives, informed opinions, interests, and needs from the participants, and discuss challenges to promoting IWRM in shared water resource management; and
- Identify opportunities, synergies, and ways of coordination towards improved cooperation for the integrated management of shared water resources.

Another meeting related to shared waters in the Arab region was organized by the UNDP/RBAS Water Governance Program for Arab States (WGP-AS)¹² on June 7-9, 2010, on the 'National Capacity Needs for the Effective Joint Management of Shared Water Resources in Arab States'. The meeting touched on an important topic for Arab States. Its objective was to come up with a set of recommendations on the best national institutional configuration, legislative arrangements, multi-disciplinary human resources capacities, technical infrastructures, and negotiating capacities required to ensure proper joint management of shared water resources while considering Arab regional specificities (WGP-AS, 2010).



There is no doubt that regional organizations can play a crucial and central role in developing awareness and understanding of the legal frameworks inspired by international water law principles for managing shared surface and groundwater resources. However, the capacity of Arab governments to avail themselves of these workshops and meetings seems to be limited. There is little evidence that these resources translate into on-the-ground progress in fostering joint management of shared water basins or aquifers. It would be instructive to discern why this is so. Water institutions in Arab countries should make a more determined effort to take a better advantage of these workshops and meetings. Moreover, joint management of shared water resources should not be held hostage to the changing political winds in the region. Inaction will make the costs of unilateral actions and political ambivalence untenable. Arab governments should also take advantage of the credible and relevant role of independent parties, such as the Sahara and Sahel Observatory, in creating a neutral arena for hosting data and models, holding consultations, and providing analysis.

3. International references/guiding tools for riparian states

At the global level, two international instruments were adopted to provide a legal framework that is used as a reference and a guiding tool for the management of shared water resources. The first instrument is the UN Convention on the Law of Non-navigational Uses of International Watercourses (1997). This Convention is not in force yet because it has not yet garnered the necessary number of ratifications (35) needed. Seven Arab States, namely, Iraq, Jordan, Lebanon, Libya, Qatar, Syria, and Tunisia have ratified the Convention. Yemen has signed the Convention, but has not yet ratified it. The Convention has codified the core principles of International Water Law, which are now part of customary international law. The principles include equitable and reasonable use and the obligation not to cause harm. The UN General Assembly adopted in December, 2008, Resolution A/RES/63/124 on the Law of Transboundary Aquifers. The Resolution is a non-binding text. However, it encourages the states concerned to make appropriate arrangements for the proper

management of their transboundary aquifers, based on the principles of the draft articles prepared by the International Law Commission included in its annex. The resolution offers therefore a reference framework for states regarding shared aquifers.

It was suggested earlier in this section that building on and reviving existing agreements must be taken seriously to bring states closer to implementing provisions of their agreements. However, in certain circumstances trying to breathe life into a 'bad' or a dysfunctional agreement, more reflective of the balance of power than any legal principle, may not yield any positive change in direction. It would be more productive in these cases to pursue a new agreement based on adherence to UN conventions and resolutions and the principles of 'equitable and reasonable use', 'equity-first', and 'cause no harm', mentioned above. It is advisable for Arab countries, who are not parties to the UN Convention on the Law of Non-navigational Uses of International Watercourses, to make every effort to sign and ratify the Convention. More critically, they should draw on principles of the Convention to establish a basis for joint management of their shared water resources.

4. What obstacles to overcome?

The obstacles for proper cooperation on shared water resources in the Arab region come in a first place from the national level. At the national level, the institutions in charge of water resources are

often numerous and lack a clear mandate which leads to overlaps and gaps in responsibilities. There are often no local institutions to manage water basins. Therefore, it is not clear what institution or agency is in charge of the water body shared with a neighboring country.

The national legal frameworks on water are often not comprehensive on the main issues regarding the management of water resources. Yet, these frameworks are important since the shared water body is managed at first at the national level. The significance of these domestic frameworks lies also in the fact that in case of an agreement with other riparian countries the decision taken at the transboundary level would need to be compatible with and translatable to the national legislation.

C. What possible triggers and steps forward?

The development of common projects is an important possibility to trigger and develop opportunities for establishing cooperation among states on a shared water resource. Havasné (2007) has suggested that joint projects are the best way forward.

Joint projects among countries sharing a water resource can facilitate cooperation by:

- Bringing water managers from each side of the border together in a forum;
- Catalyzing confidence building processes through consultations and joint scientific projects; and
- Generating scientific knowledge and utilizing it for a better understanding of the shared water system, and adopting the proper recommendations for its management.

Bringing technicians and water managers of riparian countries together to work on joint projects creates an awareness that sustainable management of shared water resources has to involve all riparian countries. In the Arab region the case of the NWSAS is instrumental in this sense, although joint management has not yet taken root. The case of the project on the Guarani Aquifer System (Argentina, Brazil, Paraguay, Uruguay) (2003-2009) could be cited here as a model for regional cooperation. The objectives of the project were "to support the four countries in jointly elaborating and implementing a common



institutional and technical framework for managing and preserving the GAS for current and future generations” (Rucks, 2009). The project is seen as to have provided a strong catalyst for cooperation at the local, national, and regional levels. Two important documents were prepared during the project:

- The Tranboundary Diagnostic Analysis which has allowed the identification of joint needs; and
- The Strategic Action Plan which has identified selected priorities to public policy development.

Both documents were prepared with a strong participatory process, thus planting the seeds for an effective governance process.

IV. CONCLUSION

In the Arab region, many states rely for their water supply on surface and/or groundwater resources that are shared with neighboring countries. Despite the importance of establishing cooperation for managing these resources, there is no case of a sound joint management of shared water resources in the Arab world. There are cases of data sharing and consultations, of agreements on a specific issue (such as a dam), and of agreements whose implementation has been hampered, but a genuine joint management of a shared water system has not taken root so far. The NWSAS is a successful case of cooperation, but is still limited to data exchange and model development and updating. It needs to transcend data sharing to joint decision-making and joint investment in the aquifer system. Building trust and cooperation in collective management of a shared water system can be a lengthy process but such an investment pays dividends in the form of socio-economic development, reduced tension, and environmental sustainability of the entire water ecosystem all for the mutual benefit of inhabitants whose livelihoods depends on the river basin or aquifer. The following actions are suggested for water policy-makers in the Arab region to advance the cause of equitable and sustainable joint management of shared water resources:

- Develop joint projects involving the riparian

states of the shared water body in order to generate new knowledge about the resource and improve the capacity to utilize that knowledge, especially in the case of aquifers which are invisible;

- Seek the assistance of regional and international organizations in providing a neutral, credible, relevant, and trustworthy arena for hosting data and models, conducting analyses, and holding consultations;
- Sign and ratify the UN Convention on the Law of Non-navigational Uses of International Watercourses;
- Seek agreements with all riparian countries sharing surface or ground water resources by drawing on principles derived from the UN Convention on the Law of Non-navigational Uses of International Watercourses and the UN General Assembly Resolution on the Law of Transboundary Aquifers;
- Develop agreements that move beyond sharing data and technical studies to establishing credible and empowered mechanisms for a genuinely joint management and investment in the shared water resource;
- Seek accommodations reflecting the principles of equitable and reasonable use and the obligation not to cause harm, rather than relying on existing power imbalances;
- Learn from earlier experiences/initiatives on shared water resources, draw lessons from their successes and failures and their achievements, and make adaptations;
- Participate actively in international fora on shared waters, and be involved in related processes (such as the UN), in order to be informed of best practices or new legal frameworks;
- Involve regional and international organizations as facilitators in the process of building cooperation and benefit from their expertise;
- Learn from the experiences of other regions of the world; and
- Improve the governance of the shared water resource locally at the domestic level.

The topic of shared waters seems to have reached a high level regionally as the Arab Water Ministers in their first meeting in June 2009 have considered the UN Watercourse Convention (1997) and acknowledged the idea of having a common Arab position.

NATIONAL GEOGRAPHIC MAGAZINE: TESTIMONIAL ON JORDAN RIVER

PARTING THE WATERS**Don Belt**

For a biblical stream whose name evokes divine tranquility, the Jordan River is nobody's idea of peace on Earth. From its rowdy headwaters near the war-scarred slopes of Mount Hermon to the foamy, coffee-colored sludge at the Dead Sea some 200 miles downstream, the Jordan is fighting for survival in a tough neighborhood—the kind of place where nations might spike the riverbank with land mines, or go to war over a sandbar. Water has always been precious in this arid region, but a six-year drought and expanding population conspire to make it a fresh source of conflict among the Israelis, Palestinians, and Jordanians vying for the river's life-giving supply.

All of which makes the scene one morning last July all the more remarkable. Accompanied by military escort, three scientists—an Israeli, a Palestinian, and a Jordanian—are standing knee-deep in the Jordan River. They are nearly 40 miles south of the Sea of Galilee, under the precarious ruins of a bridge that was bombed during the Six Day War of June 1967. The scientists are surveying the river for Friends of the Earth Middle East (FOEME), a regional NGO dedicated to building peace through environmental stewardship. It's a scorching hot day in a former war zone, but if these men are concerned about the danger of heat stroke, getting clonked by a chunk of falling concrete, or stepping on a mine washed downstream by a flood, they're hiding it well.

"Hey, Samer," says Sarig Gafny, an Israeli ecologist in a floppy, green hat, "check this little fellow out." Samer Talози, a tall, self-possessed young environmental engineer from Jordan, peers over his shoulder at the tiny invertebrate his Israeli colleague has scooped into a glass sample jar. "It lives!" he says with a laugh.

"That is one tough crustacean!" A few yards away, Banan Al Sheikh, a stout, good-natured botanist from the West Bank, is absentmindedly wading upstream while focusing his camera on a flowering tree amid the tall reeds and other riparian species along the riverbank. "Watch your step, my friend," Gafny calls out after him, "and whatever you do, don't step on a bleeping mine."

Besides lethal munitions, this stretch of the Jordan River—perhaps 25 feet wide and a few feet deep—is so polluted

that any sign of aquatic life is worth celebrating. Part of the reason is water scarcity: In the past five decades the Jordan has lost more than 90 percent of its normal flow. Upstream, at the Sea of Galilee, the river's fresh waters are diverted via Israel's National Water Carrier to the cities and farms of Israel, while dams built by Jordan and Syria claim a share of the river's tributaries, mostly for agriculture. So today the lower Jordan is practically devoid of clean water, bearing instead a toxic brew of saline water and liquid waste that ranges from raw sewage to agricultural runoff, fed into the river's vein like some murky infusion of tainted blood.

The fight over the Jordan illustrates the potential for conflict over water that exists throughout the world. We live on a planet where neighbors have been clubbing each other over rivers for thousands of years. (The word "rival," from the Latin *rivalis*, originally described competitors for a river or stream.) Worldwide, a long list of watersheds brims with potential clashes: between India and Pakistan over the Indus; Ethiopia and Egypt over the Nile; Turkey and Syria over the Euphrates; Botswana and Namibia over the Okavango. Yet according to researchers at Oregon State University, of the 37 actual military conflicts over water since 1950, 32 took place in the Middle East; 30 of them involved Israel and its Arab neighbors. Of those, practically all were over the Jordan River and its tributaries, which supply millions of people with water for drinking, bathing, and farming.

Armed confrontations over the Jordan date to the founding of Israel in 1948 and the recognition that sources of the country's needed water supply lay outside its borders. Its survival depended on the Jordan River, with its headwaters in Syria and Lebanon, its waters stored in the Sea of Galilee, and the tributaries that flow into it from neighboring countries.

Israel's neighbors face a similar situation. Their survival is no less at stake - which makes the line between war and peace here very fine indeed. In the 1960s Israeli air strikes after Syria attempted to divert the Baniyas River (one of the Jordan's headwaters in the Golan Heights), together with Arab attacks on Israel's National Water Carrier project, lit fuses for the Six Day War. Israel and Jordan nearly came to blows over a sandbar in the Yarmuk River in 1979. And in 2002 Israel threatened to shell agricultural pumping stations on the Hasbani,

LIFELINE IN THE HOLY LAND

In quieter parts of the world, the 200-mile-long Jordan might be considered a minor stream. But here, coveted by rivalrous neighbors in a rain-starved region, the river has sparked more than its share of conflicts—and occasionally, cooperation.

- Dam
 - Canal
 - Groundwater divide
- Flow direction**
- Diversion
 - Surface water
 - Groundwater



1 HEADWATERS

From springs around Mount Hermon, three rivers converge in Israel to form the Jordan. After 1948 Israel treated any upstream diversion by Syria or Lebanon as a hostile act.

2 HULA VALLEY

To boost agriculture in the 1950s, Israel drained swamps bordering the Syrian Golan Heights. Skirmishes there continued until 1967, when Israel captured the Golan.

3 NATIONAL WATER CARRIER

Completed by Israel in 1964 despite fierce Arab opposition, the canal was built to move water from the Sea of Galilee to Tel Aviv and farms in the Negev desert.

4 YARMUK RIVER

Largest tributary of the Jordan, the Yarmuk is tapped by Syria, Jordan, and Israel. Secret talks between Israel and Jordan over its water foreshadowed a peace agreement in 1994.

5 GROUNDWATER

Israel's occupation of the West Bank after 1967 gave it control of the area's three major aquifers, or basins; negotiations over groundwater began during the Oslo peace talks in the 1990s.

6 LOWER JORDAN

Partly an international border and used as a waste canal, the lower Jordan is flanked by military zones and minefields and is so polluted that it hardly supports life.

7 RED SEA-DEAD SEA CANAL

Barely replenished by the Jordan, the Dead Sea has fallen to alarmingly low levels. One controversial solution: a canal connecting it to the Red Sea.

MAPS BY
SOURCE: PROGRAM IN WATER
CONFLICT MANAGEMENT,
OREGON STATE UNIVERSITY;
MEL LAYMAN, WATERSHED GROUP
ON WATER RESOURCES, U.S.
DEPARTMENT OF STATE, WASH.



another of the headwaters in southern Lebanon.

Yet fights over water have also led to dialogue. “There are few major sources of water that don’t cross one or more political boundaries,” says Gidon Bromberg, the Israeli co-director of Friends of the Earth Middle East. “That creates a natural interdependence between countries.” Sharing resources can actually be a path to peace, Bromberg says, because it forces people to work together. In the 1970s, for example, Jordan and Israel agreed on how to divvy up water even when the countries were officially at war. And cooperation between Israelis and Palestinians over water has continued even as other tracks of the peace process hit a wall.

“It seems counterintuitive, but water is just too important to go to war over,” says Chuck Lawson, a former U.S.

official who worked on Israeli-Palestinian water issues in the 1990s. “Regardless of the political situation, people need water, and that’s a huge incentive to work things out.”

One day last April, Bromberg led me to the natural spring that provides water to Auja, a Palestinian village of 4,500 people that climbs the barren hills a few miles west of the Jordan River near Jericho. Fed by winter rains, the spring was flowing from a small, boulder-strewn oasis, and we trekked along the narrow concrete trough that transports water to the village, several miles away. “Auja is totally dependent on this water for agriculture,” Bromberg said. “As soon as this spring dries up, there’ll be no more water for farming.”

Part idealist, part political operative, Bromberg was

born in Israel and raised in Australia, then returned to Israel in 1988 to help build peace in the region. By challenging his own country to share water equitably, Bromberg has rattled the cages of hard-line Israeli politicians who see water as a national security issue—and as a resource to guard jealously.

Since occupying the West Bank in 1967, Israel has built a few dozen settlements in the Jordan Valley, in addition to the 120 or so elsewhere in the West Bank. The settlers' water is provided by Mekorot, Israel's national water authority, which has drilled 42 deep wells in the West Bank, mainly to supply Israeli cities. (According to a 2009 World Bank report, Israelis use four times as much water per capita as Palestinians, much of it for agriculture. Israel disputes this, arguing that its citizens use only twice as much water and are better at conserving it.) In any case, Israel's West Bank settlements get enough water to fill their swimming pools, water their lawns, and irrigate miles of fields and greenhouses.

In contrast, West Bank Palestinians, under Israeli military rule, have been largely prevented from digging deep wells of their own, limiting their water access to shallow wells, natural springs, and rainfall that evaporates quickly in the dry desert air. When these sources run dry in the summer, Bromberg said, Auja's Palestinians have no choice but to purchase water from Israel for about a dollar a cubic yard—in effect buying back the water that's been taken out from under them by Mekorot's pumps, which also lower the water table and affect Palestinian springs and wells.

As Bromberg and I followed the Auja spring east, we passed a complex of pumps and pipes behind a barbed-wire fence—a Mekorot well, drilled 2,000 feet deep to tap the aquifer. "Blue and white pipes," Bromberg said. "This is what water theft looks like in this part of the world."

Israel's chief water negotiator, Noah Kinnarti, disagrees. Underground water knows no borders, he says, and points out that Israelis must also purchase the water they use. "Palestinians think any rain that falls in the West Bank belongs to them," he told me at his kibbutz near the Sea of Galilee. "But in the Oslo talks, we agreed to share that water. They just can't get their act together to do it."

FOEME began confronting these tough issues in 2001,

during a period of intense Palestinian-Israeli violence. But by focusing first on ways to improve water quality, the NGO mobilized support and built trust through its Good Water Neighbors program, a grassroots education initiative. It's also working to establish a Jordanian-Israeli peace park on a midstream island. Perhaps most important, it has pressured governments to live up to the water-sharing commitments embedded in the region's peace agreements, seeking to make the Jordan River a model for the kind of cooperation needed to avert future water wars.

"People all over the world associate the Jordan River with peace," says Munqeth Mehyar, FOEME's co-director in Jordan. "We're just helping it live up to its reputation!"

When I returned to Auja in early May, its spring had been reduced to a trickle, leaving the village as dry as a fistful of talcum powder. The fields around it lay empty and exhausted, while on Auja's one plot of flat ground, boys were playing soccer amid a swirling dust cloud they were kicking up, chasing an old leather ball worn to the consistency of flannel.

I stopped by the home of an elderly farmer named Muhammad Salama. "We haven't had running water in my house for five weeks," Salama said. "So now I have to buy a tank of water every day from Mekorot to supply my family and to water my sheep, goats, and horses." He also has to buy feed for his animals because there is no water to irrigate crops. To meet these costs he is selling off his livestock, and his sons have taken jobs at an Israeli settlement, tending the tomatoes, melons, and other crops irrigated from the aquifer that is off-limits to Palestinian farmers. "What can we do?" he asked, pouring me a glass of Mekorot water from a plastic bottle. "It's not fair, but we're powerless to do anything about it."

It was a clear day, and from his front window we could see across the parched, brown valley all the way to the thin line of gray-green vegetation marking the path of the Jordan River. For a moment, its water seemed within reach. "But to get there I'd have to jump an electric fence, cross a minefield, and fight the Israeli army," Salama said. "I'd have to start a water war!"

Don Belt is Senior Editor for Foreign Affairs for the National Geographic magazine. This feature was published in National Geographic, April 2010, Water- Our Thirsty World – A Special Issue. It is reproduced in AFED Report under license.

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NOTES

- When an aquifer spans the territory of more than one state, the international community has adopted the expression "transboundary aquifer" (see UN General Assembly Resolution on the Law of Transboundary Aquifers (A/RES/63/124) (2008)). However the Arab region has always expressed its preference for use of the word "shared", therefore it is this word that will be used in this paper.
- It is the Convention on the Protection, Utilization, Recharge and Monitoring of the Franco-Swiss Genevois Aquifer between the Community of the 'Annemassienne' region, the Community of the 'Genevois' Rural Districts, the Rural District of Viry, and the Republic and Canton of Geneva (January 1, 2008).
- This Convention is not yet in force, since the required number (35) of ratifications has not been reached yet. Seven Arab States have ratified the Convention. They are: Iraq, Jordan, Lebanon, Libya, Qatar, Syria, and Tunisia. Yemen has signed the Convention, but has not yet ratified it.
- The dam has not been constructed yet.
- The Sahara and Sahel Observatory (or OSS as per its French acronym) is an international organization based in Tunis with a mission directed at issues related to water and land degradation. http://www.oss-online.org/index.php?option=com_frontpage&Itemid=200
- Details about the Nile Basin Initiative are available at <http://www.nilebasin.org/>
- The ten countries sharing the Nile established a forum for a process of legal and institutional dialogue in 1997. The UNDP provided initial funding of about US\$3.2 million to finance cooperative activities. The Nile Basin Initiative (NBI) was launched in 1999. Cooperation between Egypt and Sudan in managing the Nile water has been productive since the 1920s. Egypt supported Sudan in building Jabal Awliya Dam on the White Nile to better utilize its share of the water. In the 1959 agreement between the two countries, Sudan and Egypt agreed on seasonal sharing of the Nile water for agricultural production through which Egypt produces cotton in the spring and summer months (flood season), and Sudan grows cotton in the winter months. Egypt and Sudan cooperated in building the High Dam, and Egypt supported Sudan in building the Atbara Dam and the New Halfa irrigated schemes to help settle affected people who lost their land under Lake Nasser.
- The first part did not pretend to be exhaustive on shared waters in the Arab region.
- There was a second phase including a study on the humid zones and a third phase under implementation focusing on socio-economic aspects.
- Details about the International Commission for the Protection of the Danube River are available at www.icpdr.org/icpdr-pages/history_of_cooperation.htm
- Details about the meeting are available at <http://www.escwa.un.org/information/meetingdetails.asp?referenceNum=1131E>. The final report is not yet available.
- Details about the WGP-AS are available at <http://www.wgpas-undp.org/>