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COULD WATER CO-MANAGEMENT CONTRIBUTE TO PEACE, IN MIDDLE EAST?

Christaras B.[1]

[1] *University of Thessaloniki, School of Geology, Lab. of Engineering Geology & Hydrogeology, 54124 Thessaloniki, christar@geo.auth.gr*

Abstract

Water is the most precious resource in the Middle East, more important even than oil, given that while the citizens represent the 5% of the total world population, the Middle East & North Africa (MENA) region contains only 0.9% of global water resources (World Bank, 1996, Allan, 1999). For this reason, almost all conflicts, in Middle East, are mainly related to shared-water resources.

Historically, water was very often used as military tool or for religious purposes, Conflicts, for water management, were known from ancient years, till to the recent time. But also in our days, by 2010, the water deficit (difference between water supply and demand) is estimated to be at around 1 billion cubic meters, explaining the importance of the water to the joint futures of Palestinians, Jordanians, and Israelis.

For managing the water demand, various projects were proposed or already performed related to deep aquifers pumping, brackish-groundwater reverse-osmosis desalination, sea water desalinization, water transfer using canal or pipeline systems and dam construction. Nevertheless, it is important to understand that Peace can be possible in Middle East only if a rational and fair co-management of water resources could be real.

Key words: *Water-conflicts, water and peace, Middle-East.*

1. Introduction

North Africa and the Middle East constitute the driest region in the world. Annually, it has 355 billion cubic meters of renewable water resources, compared with 5,379 billion cubic meters in North America, 4,184 billion cubic meters in sub-Saharan Africa, and 9,985 billon cubic meters in Asia (Fisher & Askari, 2001).

Although water covers 71% of the Earth's surface, 98%, of it, is sea water, improper to be used for dinging, irrigation or even for most industrial purposes. Ground water and surface water in watercourses, rivers and lakes, account for the greater part of the planet's reserves of fresh water together with the polar ice caps and glaciers. The annual average flow of ground and surface water for the whole of the emergent lands (or "continental water") is estimated at 40,000 billion cubic metres. The arid and semi-arid zones contribute only 2% to this flow. Thus fewer than ten countries share 60% of the world's natural water resources; these are, in descending order, Brazil, Russia, China, Canada, Indonesia, the United States, India, Colombia and Congo (Sironneau, 1996).

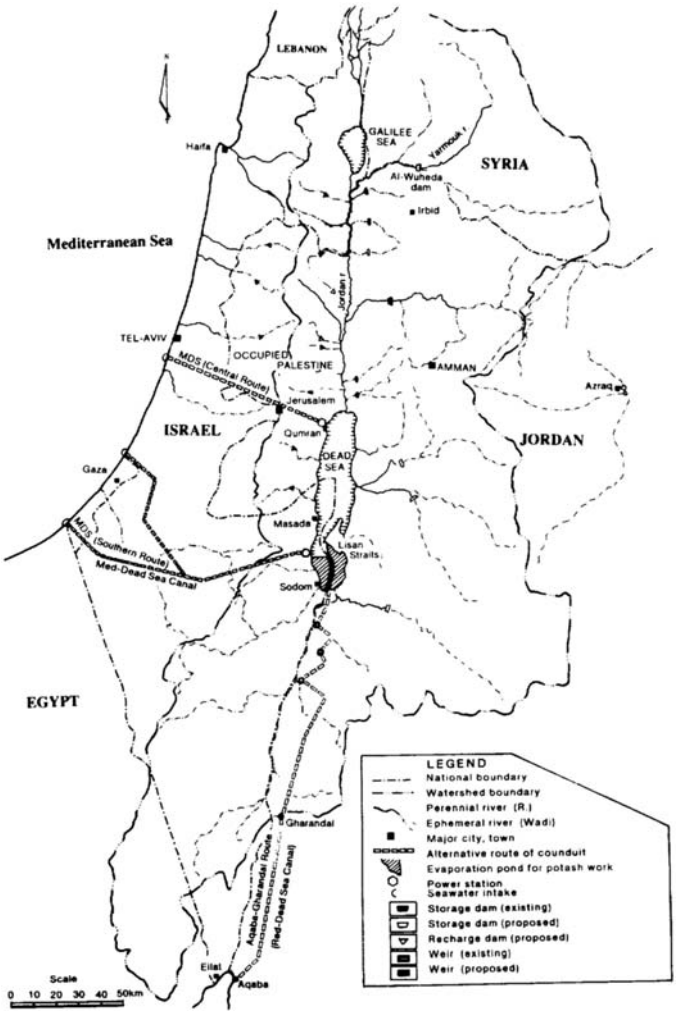

Fig. 1: Middle East water conflict area (Murakami, 1995).

2. Water use in Middle east

Water is the most precious resource in the Middle East, more important even than oil, given that while the citizens represent the 5% of the total world population, the Middle East & North Africa (MENA) region contains only 0.9% of global water resources (World Bank, 1996, Allan, 1999). For this reason, almost all conflicts, in Middle East, are mainly related to shared-water resources (Fig. 1).

By 2010, the water deficit (difference between water supply and demand) is estimated to be at around 1 billion cubic meters, explaining the importance of the water to the joint futures of Palestinians, Jordanians, and Israelis. Forty percent of Israel's water supply comes from aquifers beneath **Gaza Strip** and the **West Bank** [consisting of a) **Yarkon-Tanninim Aquifer** which supplies, annually, Israel with about $340x10^6$ m^3 of water and Palestinians with about $20x10^6$ m^3, 2) **Nablus-Gilboa Aquifer** which supplies, annually, Israel with about $115x10^6$ m^3 and 3) **The Eastern Aquifer** which supplies, annually, about $40x10^6$ m^3 and about $60x10^6$ m^3 to the Palestinians, according to H. Gvirtman*:*

http://www.biu.ac.il/SOC/besa/publications/maps /map3.jpg]. About 25 percent comes from the Sea of Galilee, which helps to explain why Israelis balked when Syria insisted on giving up control of the shoreline as well as the entire Golan Heights—often called the "water tower of the Middle East"—as the price of peace (Smith, 2000).

3. Some historical data on water conflicts

Historically, water was very often used as military tool or for religious purposes, Conflicts, for water management, were known from ancient years, even from 3000 BC, when Ancient Sumerian legend recounted the deeds of the deity Ea, who punished humanity for its sins by inflicting the Earth with a six-day storm (Hatami and Gleick 1994). In 2500-2400 BC, a Lagash-Umma Border Dispute was performed, related to the divert of water from Lagash region to boundary canals, drying up boundary ditches to deprive Umma of water (Hatami and Gleick 1994). In 1790 BC, the Code of Hammurabi for the State of Sumer - Hammurabi listed several laws pertaining to irrigation management and water theft (Hatami and Gleick 1994). Later, in 1720-1684 BC, a grandson of Hammurabi dammed the Tigris river, for preventing the retreat of rebels who declared the independence of Babylon. (Hatami and Gleick 1994). In 1300 BC, according to the Old Testament, God sent heavy rainfall in the mountains, and the Kishon River overflowed the plain and immobilized or destroyed Sisera's technologically superior forces, for supporting Barak's army to defeat Sisera and his "nine hundred chariots of iron", on the fabled Plains of Esdraelon. (Bible, KJV). In 1200 BC, in Egypt, during the parting of the Red Sea, when Moses and the retreating Jews found themselves trapped between the Pharoah's army and the Red Sea, Moses miraculously divided the waters of the Red Sea, allowing his people to escape. The waters closed behind them and cut off the Egyptian who were following them (Hatami and Gleick 1994). In 720-705 BC, after a successful campaign against the Halidians of Armenia, Sargon II of Assyria destroyed their intricate irrigation network and flooded their land (Hatami and Gleick 1994). In 705-682 BC, in quelling rebellious Assyrians in 695 B.C., Sennacherib razes Babylon and diverts one of the principal irrigation canals so that its waters wash over the ruins (Hatami and Gleick 1994).

But also during more recent periods, starting just after the 2nd World War, water became the main reason of conflict in the area (Gleick, 2008), as follows: 1948: Arab forces cut of West Jerusalem's water supply in first Arab-Israeli war, 1951: irrigation of Jordan valley, by Jordans, 1953: water transfer from the sea of Galilee, by Israel, 1955: the Al-Wahda dam was project was proposed but the construction started in 2003, 1964: the headwaters of the Dan River on the Jordan River were bombed at Tell El-Qadi, 1965: failed attack by the Al-Fatah on the diversion pumps for the Israeli National Water Carrier, with new attacks during 1965-66, 1967: Israel destroyed the Arab diversion works on the Jordan River headwaters, and occupied Golan Heights, as well as West Bank (Gleick 1993, Wolf 1995, 1997) which consist the main aquifers in Middle East, 1969: Israel led two raids to destroy the newly-built East Ghor Canal, 1974: Iraq threatened to bomb the al-Thawra dam in Syria, alleging that the dam had reduced the flow of Euphrates River water to Iraq, 1975: Iraq-Syria both-sides clams about the water flow of Euphrates River water, 1982: Israel cut off the water supply of Beirut, 1983: an explosives-laden Hezbollah's truck disguised as a water delivery vehicle destroyed a barracks in a U.S. military compound, 1990: The flow of the Euphrates was interrupted for a month as Turkey finished construction of the Ataturk Dam. Syria and Iraq considered that action not as a developing project in a big waterless area but as a weapon of war, 1991: during the Gulf War, Iraq destroyed much of Kuwait's desalination capacity, 1993: From 1993 till present, the water supplies of the southern Shiite Muslims' areas of Iraq, were drained, creating sanitation problems to the people, 2001: Palestinians destroyed water supply pipelines to West Bank settlement of Yitzhar and Kibbutz Kisufim, 2004: the United States

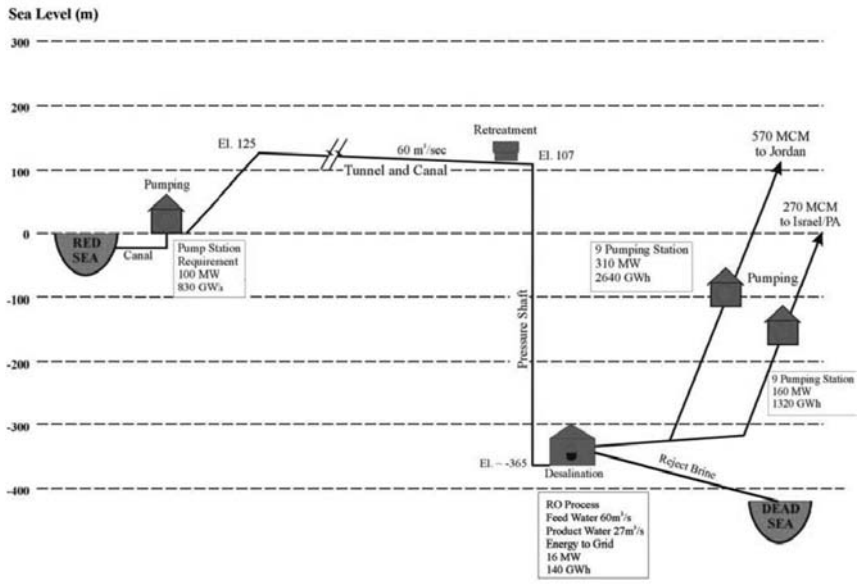

Fig. 2: Schematic presentation of the Red Sea – Dead Sea water transfer project (Beyth, 2007).

halted two water development projects as punishment to the Palestinian Authority for their failure to find those responsible for a deadly attack on a U.S. diplomatic convoy in October 2003, **2006**: Hezbollah rockets damaged a wastewater treatment plant in Israel. The Lebanese government estimated that Israeli attacks damaged water systems throughout southern Lebanon, including tanks, pipes, pumping stations, and facilities along the Litani River (Science 2006).

As populations increased, water became scarcer, aggravating regional tensions. The Lebanese had accused Israel of having designs on the waters of the River Litani, and Syria accused it of being reluctant to withdraw from the banks of the Sea of Galilee, the source of up to 30% of Israel's water. Israelis in the West Bank use four times more water than their Palestinian neighbours although the three principle underground aquifers, of Palestine, are found largely in the West Bank, as already mentioned above, in the chapter 2.

4. Water co-management for peace

For managing the water demand, various projects were proposed or already performed related to deep aquifers pumping, brackish-groundwater reverse-osmosis desalination, sea water desalinization, water transfer using canal or pipeline systems (eg. the Mediterranean-Dead Sea canal [MDSC], and Dead Sea-Red Sea canal [RSDSC], called peace valley, Fig. 1, 2) and Euphrates basins development by a series of dams and diversion tunnels for water supplying the countries of the Arabian peninsula.

Desalination is an interesting method which could mostly solve the water demand. In this framework, Israel has already started to embark on a desalination project consisting of a Seawater Reverse Osmosis Plant, with a capacity to desalinate about 100 million cubic meters (MCM). On the other hand, the Palestinian population requires at least an additional 30 to 40 MCM per year. This can only be obtained with desalination, and plans have already been drawn but any desalinated water provided to the Palestinians has to come from plants on the Israeli coast, as the West Bank has no ac-

cess to the Mediterranean Sea. Desalination will also be needed to supply the Palestinians of the Gaza Strip, where the aquifers are saline, started having high concentration of nitrates.

According to Michael Beyth (2007), the idea to study the MDSC for the generation of electricity was revived and thoroughly studied as a result of the 1973 energy crisis and the search for alternative energy sources. The goal of that project was to produce 800 MW during peak hours. The Red Sea – Dead Sea Canal was considered in the mid-1990s and re-considered in 2007 (Beyth, 2007, Fig. 2); it is the only of the system MDSC- RSDSC which is currently under consideration. The main goals of this project are a) desalination of 2000 MCM to produce 800–850 MCM with 20 to 300 mg/l TDS, annually and b) the Dead Sea (DS) level restoration at around 400 meters below sea level (mbsl).

Concerning surface waters, three important rivers, Euphrates (2,330 km), Tigris (1,718 km) and Jordan, consist the main water resources of the area. The primary users, of the Jordan River water (Fig. 1), are Israel and Jordan. Between them, the Jordan River system has been extensively exploited satisfying about half of their combined water demand. The other interested countries are Lebanon and Syria who satisfy only 5% of their water demand.

The Euphrates, which is the longest Tran boundary river in western Asia, has been developed since 4000 B.C. Several ancient civilizations in Mesopotamia were supported by basin irrigation from the Tigris and Euphrates Rivers. Owing to the extremely arid climate, however, the farm lands on the Mesopotamian alluvials have suffered from salt accumulation and water logging problems since 3000 B.C., during the Sumerian age. That ancient civilization disappeared with the abandonment of irrigation-canal systems. The washing out of accumulated salts, or leaching as it is called, can be carried out only with an efficient procedure.

In order to use and control Euphrates rivers water, large dams were constructed, the more famous of which, is the Ataturk dam (Murakami, 1995). The Tigris-Euphrates basin lies primarily in three countries-Turkey, Syria, and Iraq. Both the Tigris and Euphrates rivers rise in the mountains of southern Turkey and flow south-eastwards, the Euphrates crossing Syria into Iraq and the Tigris flowing directly into Iraq from Turkey. In southern Iraq the Tigris and the Euphrates unite to form the Shatt al-Arab, which in turn flows into the Arabian Gulf.

In order to find out an acceptable base for peace, numerous final status and peace plans have been advanced to settle the Israeli-Palestinian conflict. What is needed at first is not peace talks, but real peace actions related to land, water, security and a place to call your own. The peace process cannot be abandoned; however, Israelis and Palestinians need peace, the Middle East needs peace between Israel and the Palestinians.

It is necessary to adopt that a fair water co-management is probably the only first step toward to a permanent peace, because development creates peace.

5. Conclusions-Results

According to the above analysis, it is almost obvious that peace in Middle East is possible, only if a fair water co-management is established in the area. Several projects were elaborated during the last years proposing solutions mainly related to sea-water or brackish water desalination and transfer, between the Mediterranean Sea and Dead Sea as well as Red Sea and Dead sea, by constructing specific canals. The international scientific society could contribute to the peace, by providing or promoting ideas in this field, having in mind that, the Middle East is not only bombs and fanaticism but it is also a place where wonderful people, with dreams and hopes about democracy and peace, live there.

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