Perspectives on a Strategic Jordanian Water Project: The Red Sea to Dead Sea Water Conveyance Construction

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Abstract
The issue of surface water, in a context of sustainable development, remains a critical factor for development in arid and semi-arid countries. Many countries are still not on the track to reach the water-related targets which threaten their security, development, and environmental sustainability. Another issue of growing important is the international conflicts over water quantity and (recently) quality. Jordan is categorized between the arid and semi-arid countries, and can be considered as one of the most ten water stressed countries in the world, with an annual per capita share of water less than 125 cubic meters of fresh water resources, while the world poverty line is 1000 CM. The water shortage causes the shrinkage of investments in the industrial, commercial, tourism, and agricultural sectors which ultimately leads to negative impacts on the sustainable developments of the country and region. An interdisciplinary and multidisciplinary work is the nature of modern water management plans which leads to solve the problem from a broad view. The concept of this project is to construct a 112-mile pipeline to transfer water northward from the Red Sea to the Dead Sea to pump sea water into the salt lake while generating hydroelectric power for use in desalination. The governments of Jordan, Palestine Authority, and Israel have been enthusiastic supporters of this project, and are calling on the international community to support its multi-billion dollar project. However, detractors of the canal claim that there are numerous of archaeological and historic sites around the Dead Sea, thus it may do more environmental harm than good and suggest that the Dead Sea be naturally restored by allowing the Jordan River to flow southward unimpeded. This paper investigates the direct and indirect merits of the proposed construction and analyzes its significance and implications.

Keywords: Red-Dead Sea construction, environmental concerns, water policies, strategic plans)

INTRODUCTION
In 2008, the World Bank was launched an 18-month comprehensive assessment of the so-called “Red-Dead” Canal, a joint Arab-Israeli project designed to save the shrinking Dead Sea using water from the Red Sea as shown in Figure 1. The canal has been in the works for decades and is controversial. The Israeli and Jordanian governments are its staunch advocates, asserting that the only way to restore the Dead Sea’s water level is to construct a 112-mile pipeline, as shown in Figure 2, to transfer water northward from the Red Sea. Officials claim that this water, while descending 1,870 feet on its journey to the Dead Sea, would generate enough hydroelectricity to power desalination plants for producing fresh water. This water could then be delivered to cities in Israel, Jordan and parts of the West Bank. The canal’s Arab and Israeli supporters believe that the proposal is not only a creative solution to an environmental challenge, but a potential model for Arab-Israeli cooperation (Hani Abu Qdaais, 2008). Both national policy and research focusing on water scarcity in the Middle East take a regional or national perspective, with emphasis in the literature on alternatives to conflict (Postel 1993; Lowi 1993; Gleick 1994, Gleick 1993; Frederick 1996; Flakenmark 1986; Feitelson 2000; Lipchin 1997; Postel & Wolf 2001). Studies have and are being conducted on hydro-economic and hydro-political approaches (Wolf & Lonergan 1995; 1994) or on technological fixes (Hamberg 1995; Gavielli et al. 2002; Shelef 1995; Segev 1995) as ways of finding solutions to water scarcity in the face of increasing demand.

Opponents of the canal charge that Israel and Jordan are exaggerating its political symbolism in order to generate the needed $5 billion dollars (or more) in international financing for what is in essence a desalination and hydroelectricity project with potentially serious environmental drawbacks. As an alternative, environmental and peace activists have called on regional governments and the international community to push for a comprehensive settlement to the Arab-Israeli conflict that would include water sharing agreements and the restoration of the Jordan River and Dead Sea. Scientists assert that the Red-Dead Canal could potentially harm the Dead Sea further by changing its unique chemistry through the introduction of Red Sea water, and is too expensive to justify the costs of construction. Moreover, there is some concern that without an Israeli-Palestinian
settlement that addresses the Dead Sea border and water rights, Israel and Jordan, which concluded a bilateral peace treaty in 1994, will disproportionately benefit from the canal at the expense of the Palestinians.

The Administration has donated a small sum ($1.5 million) to facilitate the World Bank’s feasibility study; however, no U.S. Administration has officially endorsed the project. If the current study supports the canal’s construction, Israel and Jordan will most likely seek a significant U.S. pledge and appropriation from Congress to assist in financing the canal. Due to the slow progress in reviewing the canal’s construction (some believe it may take as long as 20 years to build), few U.S. policymakers have addressed the issue. In November 2007, which, among other things, called for more international attention to the serious and potentially irreversible degradation of the Jordan River and the Dead Sea.

The Shrinking of the Dead Sea Water Surface Levels Fact

The Dead Sea, located at the lowest elevation on earth, is slowly vanishing. Due to gradual water loss, the Sea has split into two separate lakes and its coastline has receded significantly. For years, Israeli and Arab governments have diverted for agricultural and industrial purposes up to 95% of the southward flow of the Jordan River, which naturally replenishes the Dead Sea. Israel diverts an estimated 60% of the river, while Syria and Jordan divert the rest. The Palestinian Authority has demanded that it receive a fair share of the river’s flow. In the last 55 years, the Dead Sea has lost 33% of its surface area. Scientists estimate that the water level of the salt lake drops approximately three feet per year. Israeli scientists estimate that even though the evaporation of the Dead Sea may slow in the coming decades, it may lose another 33% of its surface area. Observers are concerned that its disappearance will have severe ecological and economic repercussions and will deprive future generations of a historical and religious landmark. Figure 3 shows the historical decline of the Dead Sea water levels.

The reasons for this decline are well-known. First and foremost, the decline is a direct consequence of the declining freshwater input: this includes decreasing discharge from the River Jordan, increasing water use from natural springs and side wadis, and extensive use of aquifers that provide secondary water input (Klein 1985). Of all these factors, the River Jordan probably plays the biggest role (Lipchin 1997). It may be said that the Dead Sea’s steady disappearance is a direct result of the water management strategies of the River Jordan riparians (Tal 2001). While 100 years ago the River Jordan’s discharge into the Dead Sea was about 1,200-1,300 million cubic meters per year (MCM/yr) of freshwater, it has been reduced to about 900 MCM/yr by the 1940’s and now is not more than 100-200 MCM/yr of saline and polluted water (Orthofer 2001; 1994; Al-Weshah 2000; Orthofer et al. 2001; Rabi 1997; Shavit 2001). The main reason for this decline is that water from the Upper Jordan River as well as water from the Lower Jordan River is diverted for agricultural purposes.
Jordan River tributaries (e.g. Yarmouk, Zarqa) has been blocked and diverted for urban and agricultural uses inside and outside the watershed by the basin riparians, as shown in Figure 4.

Figure 3. Decline of Dead Sea water level 1976-2003 (MWI, 2006)

On top of the reduced freshwater input, more than 200 MCM/yr water are pumped out of the Dead Sea into evaporation ponds in the shallow southern basin. It is estimated that the salt industries contribute 25 to 30 % of the present total evaporation rates (Wardam 2000). It is not clear whether the Dead Sea water level has now come to equilibrium between the reduced surface and a reduced evaporation, or if it will continue to decline. As a result of the lowering of the water level, the adjacent aquifers are seriously affected (Coussin O. 2001, Yechieli 1996). Sinkholes have opened up along the shoreline, caused by lowered water tables and groundwater over-exploitation (Baer et al. 2002; Bowman et al. 2000). These sinkholes are a serious threat to infrastructure around the basin and have essentially halted future development plans such as the building of new hotels. Furthermore, the decline of the Dead Sea also affects the freshwater springs on its shores that support a unique biodiversity (Friends of the Earth Middle East 2000; EcoPeace 1998). The decline of the water level has also had a serious effect on tourism due to the disappearance of the shoreline close to the hotels (Burmil S, et al., 1999).

The declining Dead Sea undermines the potential as a tourist destination, despite the enormous investment in hotel and resort infrastructures in Jordan and in Israel. Over the next few years, there are plans for further tourism and industrial development including the construction of over 50,000 new hotel rooms (Meunier 1999). For the fledgling Palestinian economy, the present state of the Dead Sea suggests that Palestinians may never have the opportunity to develop what should have been one of their more attractive tourist locations that could provide critical employment to a growing workforce (Anati. D.A. and Shasha S., 1989).

Figure 4: The Jordan River, a narrow strip of green in a dry landscape

In all three countries, development policies have disregarded impacts on the environment, indigenous people and small farmers. Essential water needs for nature were neglected; policies lacked incentives to promote local forms of environmental security and equitable access to natural goods and services. Water is increasingly allocated to the urban sector and to large-scale agriculture at the expense of the needs and rights of the rural and indigenous people. Consequently, the rural poor and indigenous are overexploiting land resources to sustain their livelihoods.

The “Red-Dead” Construction

After years of study and evaluation, the current plan, as envisioned by the “beneficiary parties” (Jordan, the Palestinian Authority, and Israel), is to construct a 112-mile, partially covered pipeline across the Wadi Araba, a desert region between Jordan and West Bank and Israel that stretches from the Gulf of Aqaba in the south to the link the Dead Sea to either the Mediterranean (Med-Dead) or Red Sea (Red-Dead) via a canal.

It commissioned several feasibility studies and, in one instance, actually broke ground for the canal’s construction. Financial constraints eventually halted the project in 1985 (cost estimates then ranged between $2 billion and $5 billion). In addition, Jordan objected to a Med-Dead canal, claiming that, if built, it would illegally traverse the previously Israeli occupied Gaza Strip and harm Jordan’s potash mining industry in the Dead Sea. The optimism that accompanied the Arab-Israeli peace process of the early 1990s helped bring about a new canal proposal, one that linked the interests of Jordan and Israel (Elisha, R., 2006).
Observers perceive the Red-Dead Canal as having tangible benefits for Israel and Jordan that transcend more abstract notions of regional peace. Jordan is one of the ten most water-deprived countries in the world, and the estimated 850 million cubic meters of desalted freshwater that could be generated by the canal would help alleviate Jordan’s chronic water shortages. The Canal also could help restore the Dead Sea’s water levels, a task that neither Israel nor Jordan could undertake unilaterally for both political and financial reasons. Many experts assert that by marketing it as an essential component of the peace process, Jordan, West Bank, and Israel are able to solicit international financing for the multi-billion dollar project.

Jordan is the key to obtaining support from the World Bank. If the pipeline were situated on the Israeli side, the project would not be able to get this financing. Upon concluding a peace treaty in 1994, Jordan and Israel pledged to rehabilitate the Jordan Valley region and, since then, plans to construct the Red-Dead Canal steadily moved forward. In 2002, the World Summit on Sustainable Development in Johannesburg, South Africa, proclaimed that the announcement of the canal proposal sent the environment, ecology, and nature know no boundaries and no political conflicts.”

At the May 2005 World Economic Forum, held on the Jordanian side of the Dead Sea, Israel, Jordan, the Palestinian Authority (PA), and the World Bank announced that the beneficiary parties had agreed to launch a two-year $15 million feasibility study for the Red-Dead Canal. As of early 2008, the World Bank was steadily moving the feasibility study process forward. It established a multi-donor trust fund for the study. The United States contributed $1.5 million to the fund; other donors include France, Spain, Greece, Japan, Netherlands, Sweden, Spain, Britain and Germany.

Environmental Concerns

Environmentalists argue that rather than undertake a complex and expensive engineering project, the region’s governments should stop diverting the Jordan River and allow the Dead Sea to replenish naturally. However, there is no consensus, even amongst the canal’s opponents, as to how countries could use less water amidst rising demand or find new sources of freshwater. Moreover, some scientists believe that mixing water from the two seas would lead to algae blooms, causing the Dead Sea to both change color from turquoise to brown and lose its famous buoyancy. If this were to occur, it could cripple the tourist industry on both banks of the Sea. Other experts suggest that saltwater leaking out of the canal could seep into the ground and contaminate aquifers, as the canal would lie along a major earthquake fault-line. Some engineers question the cost-benefit analysis justifying the canal given the large amounts of energy that would be needed to pump water uphill before it reaches the Dead Sea and to send it to urban areas for consumption after desalination. Some scientists suggest that there would be insufficient surplus hydroelectricity to power what would be the world’s largest water pumping station and desalination plants.

A Model for Regional Cooperation

The Red-Dead Canal would spark cooperation between all beneficiary parties in a number of fields. This project will lead to regional and economic cooperation in the areas of energy, water, and agriculture and regional.

Some critics believe that the project’s “peace dividend” has been oversold. Gideon Bromberg, head of Friends of the Earth Middle East, stated that there was tremendous pressure on the World Bank to support the Red-Dead Canal because “it’s the only joint project between Jordan and Israel. Finally, other peace activists claim that the canal avoids the larger issues of managing transboundary water sources. The World Bank and its sponsors have no intention of actually forcing regional actors to address their own responsibility in the water shortage, as this would present very awkward questions for the West’s regional allies. Why, for example, is the average Israeli able to consume four times as much water, per capita, as the average Palestinian?” Despite the vocal opposition to the Red-Dead Canal, I believe that, barring a final settlement to the Arab-Israeli conflict, action is urgently needed to restore the Dead Sea and address other water issues, particularly as climate change may threaten further environmental degradation and water supply reliability. Some experts note that even if the canal is never built, it has already brought all regional countries closer on issues related to water conservation and environmental restoration. Whether governments go even further in addressing regional water shortages and the deterioration of the Dead Sea depends on political will, external support, and the ability to withstand political pressures emanating from the expected continuation of Israeli-Palestinian conflict.

Jordan Policies and Strategic Plans

With Jordan’s population expected to continue to rise, the gap between water supply and demand threatens to widen significantly. By the year 2025, if current trends continue, per capita water supply will fall from the current 156 m³ per person to only 91 m³, putting Jordan in the category of having an absolute water shortage. Table 1 show the water demand and supply projections for Jordan.
Table 1: Water supply and demand projections for Jordan (Hani Abu Qdais, 2008)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total demand</th>
<th>Total supply</th>
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<tr>
<td>2020</td>
<td>1647</td>
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Water conservation policies in Jordan are being pursued through
- Increased water recycling,
- Improved irrigation techniques
- Artificial recharge of GW using treated wastewaters;
- Reducing water loss in distribution;
- Transport seawater from Aqaba to the Dead Sea to restore its level and generate potable water using desalination; Red Sea – Dead Sea Conduit.
- Constructing new dams, the construction of Al Wehdah Dam; and
- Upgrading domestic wastewater treatment plants.
- Water desalination (brackish and sea water)
- Improving water supply network.
- Water conservation programs (agriculture and at large users).
- Reclaimed water reuse; treated domestic (black + grey water) and industrial

SUMMARY AND CONCLUSIONS
The Dead Sea basin plays a major role for regional economic development (industry, tourism and agriculture) in the Middle East. This potential is threatened by the steady disappearance of the Dead Sea. Since around 1930 the water level of the Dead Sea has fallen by about 25 m, about half of this alone in the last 20 years. The Dead Sea is a transboundary resource shared by the Palestinian Authority, Jordan, and Israel. The Dead Sea is the terminal point of the Jordan River watershed and as such, it serves as a barometer for the health of the overall system. Its rapid decline reflects the present water management strategies of the riparian and upstream countries. This includes the different water cultures of the three countries.

Throughout history, the Dead Sea basin has served as a source of refuge and inspiration for followers of Islam, Christianity and Judaism. Today, the religious significance of the Dead Sea is being overshadowed by its rapid disappearance. This may be explained in part by the water cultures of the three countries that influence water policy in the region. Ideology, together with culture and tradition, has played a central role in water development in the region. In many cases, this has been at the expense of the environment. Elements pertaining to environmental security and water culture and tradition, whereby a sustainably managed environment provides for social, economic as well as environmental benefits are evident with regards the Dead Sea. The decline for example, undermines its potential as a tourist destination, despite the enormous investment in hotel and resort infrastructures in Jordan. The decline also raises ethical issues about the exploitation of water resources by present generations at the expense of this natural heritage to future generations.

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