

ENVIRONMENTAL SUSTAINABILITY AND HYDRO-POLITICAL CRISIS OF JORDAN RIVER BASIN IN MIDDLE EAST: AN ANALYSIS

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ABSTRACT

The Jordan River rises in Mount Hermon, at the juncture of Syria and Lebanon and drains one of the world's driest countries and planet's most water deficit region. The river runs through Lebanon, Syria, Jordan Israel and Palestine for 251 km and finally dribbled down into the Dead Sea. It is an important water source in the region and due to climate change, the region is becoming drier with the time. Historically, the river valley had a lush green, wetland ecosystem and was the biological heart of the Middle East region. A European explorer once described it as "the crookedest river that was". The river has now seen that over 90 per cent of its water has been diverted and obstructed by the construction of dams and diversion for irrigation as well as for domestic use in the region. Competition for limited and scarce water resource has generated hydro-political tension among the shareholders of the region; the region is correctly described as the "global hotspot of unsustainable water use. Jordan, the world's third driest country of the world pulls 160 per cent from the underground reservoirs than puts in, out of which 60 per cent is consumed for agricultural purposes. Many countries of the Fertile Crescent region fall well below the world's average annual water availability. The upstream dams and diversion have totally reduced the flow of the river in the lower region where it flows snakes through various ecologically rich smaller lakes. The obstruction of the natural flow of the river has a negative and excruciating impact on the biodiversity of the valley region. There is a need for regional cooperation like Red-Dead project for the management of water resource in the region based on the principle of environmental sustainability. The study is solely based on documentation-including academic research works, government reports, and newspapers.

KEYWORDS: *Jordan River, Hydro-Political Crisis, Environment, Sustainability*

INTRODUCTION

From the beginning of mankind water over the planet has been seen as a basis of mutual cooperation and peace. There have been very few occurrences of clashes over the claim and entitlement to water resources in the history of civilization as well as in modern period. It is an important water source in the region and due to climate change, the region is becoming drier with the time. Historically, the river valley had a lush green, wetland ecosystem and was the biological heart of the Middle East region. The rivers of the region have great importance especially Jordan river that is sacred to the Judeo-Christian tradition. Water bodies have always nourished human life and supported the flourishing of agriculture human settlements, the rise of states and the growth of population. The rivers of Middle-East Asia have been the birthplace of modern civilization as well as a theatre of hydro-political conflicts with the establishment of the Israeli state.

There has been a tendency to use water as a weapon of the war rather than as a source of nourishing man-kind as well as the environment. Some states use water infrastructure as a target in war conflict; others treat as an instrument of violence. The Jordan River basin region is one of the world's tensest areas and the danger of war is not averted yet. The water resource and hydrological matters no doubt present another dimension to the Arab-Israeli conflict. Portable water shortage is a worldwide phenomenon; however, the water crisis in the Jordan River basin is not only an environmental concern but also a political issue that affects the political stability in the basin region. The region falls in the sub-tropical region that is characterized by the arid and semi-arid and creates an environment of extreme with very high rainfall, low and meager precipitation and high salinity.

DATABASE AND METHODOLOGY

The study is solely based on secondary sources of data obtained through various published and unpublished sources. Other related information, literature, documentation-including academic research works, government reports, and newspapers. The paper is based on analytical and exploratory research of methods.

OBJECTIVES

The major objectives of the paper are;

- To find out the area of scarce water resources in the Jordan river Basin
- To analyze the hydro-political crises and water sharing plans in the Basin

LITERATURE REVIEWS

Francesca (2014)

In his research work highlighted the various aspects of the vanishing water landscape in the Middle East. He has thoroughly studied the genesis and nomenclature of important rivers, watercourses and its utility in the region. He has also provided the political narratives and traditional beliefs surrounding water and its scarcity in the extreme arid region of the world. There are several of approaches and set of indicators to measure the degree of water scarcity; researchers have tried to figure out water scarcity with several indicators, accounting for both physical and economic water scarcity (Falkenmark, 1989); has used the availability of water per capita to measure the water scarcity in a region. **Rijsberman**, (2006) in his work he has included economic, technological, and political considerations to gauge the degree of water scarcity.

The Falken Marks

Indicators are extensively and commonly used to define the extent of water scarcity of a country through its Water Scarcity Index (WSI) According to the WSI, there are three types of water scarcity the first one is water stress (1,000 Cubic Meters to 1,700 CM of freshwater per capita), second one is water scarcity (500 CM to 1,000 CM of freshwater per capita); and the last one is severe water scarcity (less than 500 CM of freshwater per capita). **Rijsberman**(2006) added that access to water needs to be also accounted for, as often this is not due to water shortage, but rather due to poor infrastructures and mismanagement in the water delivery services. In his work **Mehta** (2000) has critically examined some of the global arguments and narratives related to water scarcity, water crises, and water resources management and displays what they are complicating. He has also evaluated various positions on water ranging from those viewing water as an economic good to those viewing water as a human right and the commons. He has highlighted how global debates on

water tend to draw on rather ambiguous political, economic expectations rather than on pragmatically grounded facts and realities.

Movik (2012)

He has emphasized that there are structural inequality and distribution in the water sector which comes from the West Bank, where it has been claimed that water scarcity is an issue of organizational discrimination against Arabs and Palestinians people. There has been unrestricted access to water to illegal Israeli settlements like it was in apartheid South Africa, where inequalities based on discriminatory policies were extensive. There has been taken various attempts to solve the water sharing problems for the whole basin from as early as 1913 when the Franjeh Plan was recommended, and 1955, when the Johnston Plan was conceived, not one single plan has been utterly adhered to. The Franjeh Plan was envisioned for the irrigation of the Jordan Valley, to generate hydropower and to transfer Yarmouk River flow (100 million m³) to Lake Tiberias (Sofer et al., 1999). Once Boutros-Gali in his study on water problem in Middle East Asia prophesied that “the next war in the Middle East will be over water, not politics” (in Butts, 1997: 65).

Mirumachi and Zeitoun (2012)

In his perusal study of the role of treaties, which has always been seen and recognized as a good instance of cooperation. They maintained that cooperation is not always good, as treaties can codify existing asymmetrical status quo, and treaties can become the issue of the conflict. **Homer-Dixon (1991)** has analyzed several shared river basins of the Middle East as well as of the world and concluded that “the renewable resource most likely to stimulate interstate resource war is river water”. **Sidahmed (2014)** in their study on the crisis of survival in the Middle East evaluated the various causes of water-related violence in the region. They are of the view that the destruction of water infrastructure is the most widespread characteristics of conflicts in the Jordan river basin region. **H Mulholland (2011)** in his study entitled ‘water politics in the Middle East, has clearly stated that the salient issue of water shortage in the region is overshadowed by another different sensational problems like the oil crisis and the Arab Israel disputes. In his studies he has evaluated three case studies from the region: Aquifers on the border of Jordan and Saudi Arabia, the Jordan River Basin and Tigris and Euphrates river basin.

The Geography of Jordan River Basin

The Jordan River Basin is a trans boundary basin with a total area of about 18500 km² of which 40 percent is located in Jordan, 37 percent in Israel, 10 percent in the Syrian Arab Republic, 9 percent in the West Bank, and 4 percent in Lebanon (Lehner et al, 2008) (Table 1). The Jordan River basin covers an area of 0.28 per cent of the total area of the Middle Eastern countries and it has an annual flow of around 1300 mm³. The headwater of the 250 km long Jordan River originates from three rivers, the Dan, the Baniyas, and the Hasbani, which merge at a point 5 km south of the northern Israeli border then flow south through the Hula Valley to join Lake Tiberias. The part of the Jordan River Basin (JRB) located above the Sea of Galilee (Lake Tiberias) is known as the upper Jordan and the land area below to it is known as Lower Jordan. With the outflow of the Jordan River from Lake Tiberias, the Lower Jordan River receives the water from its main tributary, the Yarmouk River. The river encounters other smaller streams in its course like Harod and Yabis, the Fariah, Zarqa, and Nusayrat (Hellel, 1994, p.155). The river then continues flowing south, forming the border between Israel and the West Bank to the west and Jordan to the east and finally ends in the Dead Sea (Green Cross Denmark, 2006).

Jordan River is a holy river where Jesus the Christ was baptized by the John the Baptist. It played also a well-known role in history. The river has its importance because it is located in an area where every drop of water counts.

The Upper Jordan River Basin, Just north of Lake Tiberias, contributes the vast majority of the water while the Lower Jordan River Basin, which represents 40 percent of the entire Jordan River Basin, makes a much smaller contribution as the norther part get much more precipitation that the southern part. The western of the Jordan river Basin also get more rainfall as compare to the eastern part of the Jordan River Valley that why the eastern part is dry in nature. During the summer, most side streams dry up completely and capturing the winter floodwaters is one of the most critical aspects of water resources management in the Jordan River Basin. If these waters are not diverted or stored, they flow directly to the Dead Sea (Green Cross Italy, 2006).

The Dan River is the largest tributary of the Jordan river system which rises in northern Israel from the karstic area near the base of mountain Hermon. It further fed by rain and multiple springs around the source region which is in Tel Dan along underground fault lines. Dan River flows in Palestine (Israel) and is a principle source of the Jordan River share more than 50 per cent of the water of upper Jordan river Basin. Banias River is located at the southern foot of Mount Hermon north of the Golan Height. It runs for a total length of 9 km and finally merged with the Dan River. The springs are the main source of water for the Banias River. It is one of the main tributaries of the Jordan River that form the Jordan river's upper catchment. Hasbani is one of the major and important tributaries of the Jordan River System. The River collects most of its water from two main springs in Lebanon the first one is Wazzani and the second one is Haqzbeih the latter being a group of springs on the upper course of the Hasbani. The riverdrifts for 25 miles in Lebanon before crossing the border at Ghajar and shortly after joining with the Banias and Dan River at a point in northern Israel where it finally discharges into River Jordan. For about four kilometers downstream of Ghajar, the Hasbani forms the border between Lebanon and the Golan Height.



Figure 1: Jordan River Basin in the Middle East

Source: FAO, Equastat, 2009

The Yarmouk river rises on a lava plateau in southern Syria and flows westward through a deep gorge cut through limestone surface along the Jordanian border of the Golan Height. The Yarmouk River originates in Jordan, then forms the border between Jordan and the Syrian Arab Republic and then between Jordan and Israel, before flowing into the Lower Jordan River. The Yarmouk River is the main source of water for the King Abdullah Canal (KAC), the backbone of development in the Jordan Valley. A main tributary of the Jordan River in Jordan, controlled by King Talal Dam and also feeding the KAC, is the Zarqa River. The Yarmouk River, which is the main watercourse in this latter part of the Valley, joins the Jordan River in an area partly occupied by Israel. The riparian river has always been in conflict and war for the use of precious water of the river. The Yarmouk river is much smaller than the Euphrates or even the Litani river but supplies up to 50 per cent of the water flow in the lower Jordan river. The Yarmouk is only 20 miles (32 km) long in a straight line, but because of the many convolutions in its course, the total length of the stream is about 50 miles (80 km). Technically Yarmoukriver is considered as an independent river in itself. Finally, it empties into the Jordanriver just 6.4 km south of the Sea of Galilee or Lake Tiberias. The most efficient use of the Yarmouk River is to collect and store excess water during the rainy winter season to supplement the dry and extreme summer. The vegetation in this region is dominated by short grasses and drought-resistant scrub.

Table 1: Country wise area in the Jordan River Basin

Countries/Territories	Area of Country in Basin	Percent of Area of Basin	Per cent of Total Area of the Countries
Jordan	7470	40.4	8.4
Israel	6830	36.9	32.9
Syria	1910	10.3	1.0
West Bank	1620	8.8	28.7
Lebanon	670	3.6	6.4

Environment and Ecosystem

Ecosystems of the region are extremely diverse, ranging from sub-humid Mediterranean environments to arid climates across very small distances. Climate projections for the eastern Mediterranean indicate future aridification (GLOWA, 2007). The average annual precipitation in the basin is projected at 380 mm, although it varies all along the basin area (New et al, 2002). The Upper Basin, north of Lake Tiberias, has comparatively more annual precipitation than the southern part of the basin. In the norther part, annual precipitation is up to 1400 mm, while the Lower Jordan Basin has an average annual precipitation rate of 100 mm at its southern end. The largest part of the fertile land in the basin is located in Jordan and the West Bank, along the eastern and western banks of the Jordan River and the side wadis, which have the annual rainfall of less than 350 mm. The average annual temperature of the whole Jordan River Basin is nearly 18 °C. The average temperature of the Jordan River Basin in January is 9 °C, although it can drop to 5 °C in the coldest places. In August, the average temperature of the Jordan River Basin reaches 26 °C, rising to 30 °C in the hottest places.

There are total of four Jordan River Basin riparian countries that include Syria, Lebanon, Israel, and Jordan. Palestine is the last and fifth shareholder that consumes the Jordan River’s limited water resources. All the riparian states are destined to have an arid environment. Lebanon has some moderate environment whereas, nearly 70 per cent area of Syria is arid and desert type, Israel 60 per cent, and more than 80 of the Jordan is desert (Dolatyar and Gray, 2000). Jordan is the third driest country in the world.

The Jordan Valley was once a lush marshy wetland ecosystem that was known as the biological heart of the Middle Eastern region. The region lies in the Great Rift Valley- a meeting point of the Asian, European and African continents, which is also at the crossroad of biodiversity. The region is located in the Middle East, which is a unique transition zone between three major biographic domains- the Palaearctic, Afrotropical and Oriental realms. The Jordan River has a high number of faunal and floral elements of three domains, with the additions of some local and euryhaline taxa (an organism that can survive and thrive in a wide range of salinity condition (NisreenAlwan 2013). Lake Hula or Hula Emeq, with its surrounding swamps, was one of the richest ecosystems in terms of biodiversity in the Jordan basin. There were various species of aquatic invertebrates and vertebrates and other species of aquatic vegetation. The lake was also an important nesting place for many peculiar migratory birds. Sea of Galilee also known as the Kinneret is the largest natural lake in the Middle East and the lowest freshwater lake on the earth (209 meters) below the sea level. The lake also has some biotic diversity relative to that of the Lake Hula.

The construction dams, canal pumping stations, and diversion of water streams have largely decreased the flow of the Jordan River by more than 90 per cent. The highly exploitative natures of the riparian states which are warranted by high population growth, urbanization have modified the course of the river that has also altered the hydrology of the river systems of the region. Due to the excessive drawing of underground water, there have been cases of deterioration of fresh aquifer water of the region. The dumping of sewage, industrial and household wastewater and chemically contaminated agricultural runoff has severe damage the freshness and quality of the water of Jordan River Basin that has badly affected the biotic life of the region. Competition for scarce water resources in the midst of conflict allowed little room to think about the needs of the river. Need and desire for Economic prosperity and the cultural belief in making the desert bloom and thereby conquering nature was the prevalent ideology of riparian countries on both sides of the Jordanriver. The river converts into a different kind of stream that contains Israeli, Jordanian and Palestinian sewage, saline water and agricultural runoff are most of what is left to flow in place of fresh water into it.

In January 2007, Jordanian and Israel governments have agreed to establish a peace park at the confluence of the Jordan and Yarmouk rivers. It will help to aware the citizen about the cost of the precious water resource. There are various studies and examination that reveals that the river still flows full of sewage which indicates how much attention is required and work is to be done. The incremental policy measures of demand management, water conservation, pricing reforms and removal of subsidies are unlikely to attract media attention and therefore gain a high level of political support. Conflict, Competition and cultural arrogance have been responsible for the demise of the Jordanriver system. Cooperation and mutual collaboration based on the principles of sustainability is what is believed will revive the Jordan and bring peace for the population of the most conflict-prone area of the world that is the Middle East especially the Levant region.

Hydro-Political Crisis

More than 35 per cent of the existing water resources in the Jordan river basin account as Surface water, groundwater aquifers account for 56 percent of the resources, while reused wastewater and other non-conventional sources of water represent nearly 9 percent. The surface water of the Jordan River Basin is the main surface water resource available for relatively stable use in the region. It is the major source of water for Israel and Jordan and also supports the many aquifers in both countries, extending the reliance on the river (Green Cross Italy, 2006). The region has one of the lowest per capita water resources worldwide, well below the typical absolute water scarcity threshold of 500 m³/year per

capita, except for Lebanon. Moreover, water demand in the region continues to increase rapidly due to high population growth rates and economic development.

Johnston, envoy of US president during 1953-53 advised to distribute its water between riparian countries to avoid conflict between sharing countries. According to the Johnston plan of the water sharing and its use has been given in table 2.

Table 2: Johnston Original Plan of Water Sharing During 1953-55

Countries	Share in Jordan River's Water (Mm3/yr.)
Palestine	257*
Jordan	463
Israel	400
Syria	132
Lebanon	35
Total	1287

*at the time of the plan, the Palestine West Bank was ruled by Jordan, therefore the share of Palestine and Jordan was set together at 720 Mm3/yr. Some literature estimated the share of Palestine around 257 Mm3/ yr., some other estimated it at 215 Mm3/yr.

However, the present scenario of water uses of Jordan River is a total different one that is shown in table 3.

Table 3: Share in Jordan River's Water

Countries	Share in Jordan River's Water (Mm3/yr.)
Israel	700
Palestine	0.0
Other riparian countries of the region (Jordan, Syria and Lebanon)	410
Total	1110

From the above table 3 is clear that Israel uses more than 700 Mm3/yr. which 300 more than its original sanctioned volume. The other three riparian states use only 410 Mm3/yr. whereas, Palestine uses nothing. Before 1967 Arab-Israel war Palestine in the West Bank had access to the Jordan River and could use some its water through a various pumping station. After the occupation of the West Bank, Israeli forces destroyed the station or confiscated all the pumping station. The water crises of Palestine had warranted the Oslo accord of 1993 that provided sharing water to the Palestinian population. Due to some water sharing problems arise after first Oslo accord there were Oslo II pacts which have given more right on the water to the Palestinian to its original pact.

The Jordan Basin conflict can be designated as having gone through two junctures. The power dynamic and nature of inter-state relations between Israel and Jordan account for the failure to build a formal water sharing arrangements. This is the reason why in 1955, the Arab states rejected to settle negotiations on the Johnston Plan sponsored by the United States. Johnston Plan failed due to various reasons. Eric Johnston, the US special envoy, "believed the Arabs would cast aside their determination to regain Palestine for the economic good of two basin states, Israel and Jordan." (Lowi, 1995).

There is political implication with respect to water rights and territorial supremacy and insecurity. Israel uses the Jordan water for domestic consumption as well as industrial and agricultural uses. The stark water shortage in Jordan means that using water for the drinking supply is the main concern. For Israel, water has economic value but is a matter of survival and existence for Jordan. Syria refuses to exchange water rights with Israel because that would recognize Israel sovereignty. Severe water deficiency in Jordan leaves little choice but to talk with Israel, Israel fears negotiating water rights because it might encourage the Arab States to claim more territory.

CONCLUSIONS AND SUGGESTIONS

The Middle East, in general, belongs to the areas of high and rapid population growth rates of the world. The socio-cultural and in part of the pro-natality programs and policies of the governments, result in high fertility rates in most of the Arab countries. Jordan, Syria and Palestine all exhibits growth rates of more than 3% meaning a double of the population each 20-25 years or even sooner. The high population growth rate has marked spreading out of the irrigated area in recent years and adaptation of western styles. The consequences are that the available resources are highly over-exploited. This means that every drop of available of water is diverted from the natural cycle for human purpose, and even more, water is utilized than the cycle provides. The water conservation and protection of the quality of water are of utmost important. Along with the quality of water, every industry must include water treatment plants. There should be law and governance about the use of water for irrigation as the region comes under the most water scarce region of the world so the farmer must use highly advanced irrigation systems. There should be a restriction on the use of water fertilizer. Least but not the last, every state of the region must come to a single platform and have cooperation regarding the protection of water and equal and proper share of available water.

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