TOWARDS A LIVING JORDAN RIVER:
A Regional Economic Benefits Study on the Rehabilitation of the Lower Jordan River

December 2012

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EcoPeace/ Friends of the Earth Middle East (FoEME) is a unique organization at the forefront of the environmental peacemaking movement. As a tri-lateral organization that brings together Jordanian, Palestinian, and Israeli environmentalists, our primary objective is the promotion of cooperative efforts to protect our shared environmental heritage. In so doing, we seek to advance both sustainable regional development and the creation of necessary conditions for lasting peace in our region. FoEME has offices in Amman, Bethlehem, and Tel-Aviv. FoEME is a member of Friends of the Earth International, the largest grassroots environmental organization in the world.

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The views expressed are those of EcoPeace/ FoEME and do not necessarily represent the views of our expert team, project advisers, participants in the project’s National and Regional Jordan River Forum and Council meetings or our funders.

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Regional Terminology

No single geographical name applies to all periods and to the same designated area of land that encompasses modern Jordan, Palestine, and Israel. We therefore use the term “region” in this publication when referring to the aforementioned area. Many individual locations in the region are recognized by several alternative names. Whenever possible, we introduce locations with these alternative names and then use the internationally recognized name throughout the report. In the case of English spellings, we have endeavored to select the most commonly used spellings.

The terms “Palestine,” and “West Bank,” are used in different contexts throughout the document to designate what some perceive as the same geographical area. “Palestine” is used to refer to the future State of Palestine, and includes a government, defined territory, and a specific population. “The West Bank” is a geographical term that designates the portion of the British Mandate over Palestine that was annexed by Transjordan when it became Jordan. Israel occupied the West Bank in 1967 (Brooks, 2012).
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EXECUTIVE SUMMARY

INTRODUCTION
The Jordan River, one of the world’s most famous, has been reduced to a little more than a drainage ditch after years of neglect. However, given its rich heritage and environmental importance, rehabilitation of the Lower Jordan River (LJR) brings with it the potential for significant cultural, ecological, and economic benefits. Prior to this study, the extent of the potential economic benefits had not been investigated. This Regional Benefits Study is intended to directly benefit Jordanian, Palestinian and Israeli decision makers and stakeholders. This study provides a critical scientific tool to help these decision makers determine how water resources should be allocated in the LJR basin by identifying the benefits that can be derived from various rehabilitation scenarios. Furthermore, this study’s findings provide decision makers, donors, and regional actors with insight and appraisal of opportunities for development that would result from a rehabilitated LJR. These results identify positive-sum outcomes to responsible river management and rehabilitation of the LJR.

The study’s central framework is comprised of considerations of tourism development and ecosystem services available to a rehabilitated LJR. The results of this study will be used as an advocacy tool with local communities, municipal authorities, national stakeholders and various actors of the international community to increase political will amongst national decision makers to rehabilitate the LJR.

BACKGROUND ON LOWER JORDAN RIVER
The LJR and its tributaries are shared among the nations of Israel, Jordan, Syria and Palestine. The LJR flowed freely for thousands of years from the Sea of Galilee to the Dead Sea creating a lush wetland ecosystem, rich in biodiversity. This narrow corridor also serves as one of the most important migratory flyways on the planet. The river has been immortalized in the holy books of Judaism, Christianity and Islam. Unlike any other river on earth, the LJR remains an important cultural anchor for half of the world’s population.

Though still unique in its natural and cultural wealth the “mighty Jordan” has been reduced to a trickle south of the Sea of Galilee-devastated by over-exploitation, pollution, and a lack of regional management. Large scale water diversions by Israel, Jordan, and Syria have resulted in a severe decline in water inputs, to the point that current flows are less than 5% of natural flows. Much of the water flows are effluents, agricultural runoff and drainage of poor water quality. Furthermore, Israeli diversion of saline springs to the LJR, while improving water quality in the Sea of Galilee, have led to a large increase in the LJR’s salinity. The decline in the quantity and quality of the river’s waters has imposed a huge toll on the ecology of the LJR. This, in turn, has reduced the potential for visitors to enjoy the river and its surroundings, a situation exacerbated by the status of much of the area as a closed military territory with limited access.
CURRENT LEGAL AND POLICY FRAMEWORKS, INSTITUTIONAL CONSTRAINTS AND NECESSARY ENABLING CONDITIONS

Currently several governmental agencies in each of the three riparian governments have a range of plans to develop the areas around the LJR. However, there is little coordination between the three governments, and there are often overlapping mandates across agencies within the individual governments at both the national and local levels. Currently, the LJR itself is under military control of Israel and Jordan, and access to the LJR is extremely limited to all parties, especially the Palestinian population, for whom access to the whole region along the LJR is also restricted. The area is designated Area C under the Interim Peace Agreement of 1993 (Oslo Accords) between Israel and the PLO, according to which the whole West Bank portion of the Jordan Valley is under full Israeli military control. As a result, Palestinians have little ability to visit the region or to invest in developing the area economically.

Several policy conditions need to be met in order to take full advantage of a rehabilitated LJR. These include freedom of access for all populations, government support in terms of promoting sustainable development in the area (especially in the tourism sector), international support and investment guarantees in order to mitigate risk faced by investors, investment in developing human capital, especially in terms of provision of eco-tourism services, and general awareness raising campaigns to overcome current views of the LJR as a degraded and polluted river.

BACKGROUND ON NON-MARKET VALUATION

Rehabilitation of the Lower Jordan River (LJR) involves numerous economic costs and benefits, including some that are more easily measured, such as the cost of infrastructure needed, and those that are more difficult, such as the value of ecosystem services. In this study we employ multiple methods to value the benefits of rehabilitation of the LJR and compare them to the opportunity costs of the water needed for rehabilitation (i.e., the value of the water as it is currently used).

Environmental services and improvements thereof, are what economists call “nonmarket goods”, to indicate that these are not purchased directly, as are typical commodities. There are two main types of valuation methods by which these potential welfare effects can be estimated: 1) Revealed preference methods and 2) Stated preference methods. The former measures changes in economic welfare resulting from changes in use of an environmental good or service, while the latter addresses “non-use” welfare measures as well, for example, individuals’ willingness to pay (WTP) for environmental improvement, even if they do not use the resource directly.

A small number of studies in the recent past have attempted to estimate the economic value of stream rehabilitation in the region, with all finding the value to be significant. None of the studies specifically looked at the LJR, which is a much larger scale project than rehabilitation of the region’s other streams. This study is an attempt to address this gap in knowledge.
METHODOLOGY

In order to estimate the economic value of rehabilitation of the LJR, three consultant teams (one from each country), under the coordination of Friends of the Earth Middle East (FoEME), administered nearly identical surveys. The surveys explained the current status of the Lower Jordan River. Each then gathered information regarding respondents’ relative preferences for each one of four possible rehabilitation scenarios covering two levels of flow and two levels of water quality. The four scenarios presented are as follows:

- **Scenario 1** – increased flow to 220 mcm/y, roughly 7 times current flow, of moderate quality
- **Scenario 2** – increased flow to 220 mcm/y, roughly 7 times current flow, of good quality
- **Scenario 3** – increased flow to 400 mcm/y, roughly 13 times current flow, of moderate quality
- **Scenario 4** – increased flow to 400 mcm/y, roughly 13 times current flow, of good quality

As the average respondent is unfamiliar with flow and water quality parameters, each scenario was also described in terms of the expected attributes associated with each in terms of recreational opportunities (e.g., boating, swimming, fishing, etc.) and levels of ecological functioning. In order to facilitate understanding, the scenarios were represented by illustrations as well as written descriptions. Each survey utilized three different methods to estimate Willingness to Pay (WTP) for the four scenarios:

a) **Contingent behavior Travel Cost Method (TCM)** – which calculates benefits based on expenditures of visitors to the region and stated changes in visitation rates based on the various rehabilitation scenarios.

b) **Contingent Valuation Method (CVM)** – which calculates benefits based on responses to a WTP survey for each of the various rehabilitation scenarios.

c) **Choice Modeling (CM)** – which calculates benefits based on sets of choices from among various rehabilitation scenarios, each associated with a particular cost.

After testing pilot versions of the survey in order to ensure understanding of the materials, the three consultancies administered surveys in various locations throughout their respective countries, in order to capture regionally and socio-economically representative cross-sections of the population. Both locals and international tourists were surveyed. The distribution of usable surveys is presented in Table ES1 below. Survey results were adjusted in some cases in order to ensure that the responses more closely matched a representative sample of the populations.

<table>
<thead>
<tr>
<th>Table ES1. Survey Sample Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locals</strong></td>
</tr>
<tr>
<td>Israelis</td>
</tr>
<tr>
<td>Locals</td>
</tr>
<tr>
<td>Tourists</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
RESULTS

Economic benefits for the local populations (i.e., not including the international tourists) differed significantly depending on the method chosen. As expected, in all cases, Scenario 1, which has both lower water quality and quantity, was valued least, and Scenario 4, which has both higher quantity and quality, was valued most. Two methods (TCM and CVM) indicated that economic benefits from additional water were valued more highly than marginal improvement in water quality, however results from the CM model seemed to contradict this.

In order to put the benefit estimates in context, they were compared to the costs of the various rehabilitation scenarios. The cost of water for Scenarios 1 and 2 were based on estimates provided by an earlier study commissioned by FoEME. The costs for Scenarios 3 and 4 took the cost of desalination as the opportunity cost of foregone revenues from current uses. For this, and other reasons, the estimates of the costs used in this study are likely higher than actual costs and can be viewed as an upper-bound estimate. Comparisons of the benefit and cost estimates are presented in the Tables ES2-ES5 below.

Table ES2. Annual benefits from CVM survey – Total Value (millions of USD)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>33</td>
<td>64</td>
<td>78</td>
<td>134</td>
</tr>
<tr>
<td>Jordan</td>
<td>47</td>
<td>84</td>
<td>98</td>
<td>170</td>
</tr>
<tr>
<td>Palestine</td>
<td>10</td>
<td>19</td>
<td>21</td>
<td>46</td>
</tr>
<tr>
<td>Total Benefits</td>
<td>90</td>
<td>167</td>
<td>197</td>
<td>349</td>
</tr>
<tr>
<td>Annual Costs</td>
<td>46</td>
<td>50</td>
<td>151</td>
<td>151</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>44</td>
<td>117</td>
<td>46</td>
<td>198</td>
</tr>
</tbody>
</table>

Table ES3. Annual benefits from CVM – use+option values only (millions of USD)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>16</td>
<td>31</td>
<td>37</td>
<td>63</td>
</tr>
<tr>
<td>Jordan</td>
<td>22</td>
<td>39</td>
<td>46</td>
<td>79</td>
</tr>
<tr>
<td>Palestine</td>
<td>5</td>
<td>9</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Total Benefits</td>
<td>42</td>
<td>79</td>
<td>93</td>
<td>165</td>
</tr>
<tr>
<td>Annual Costs</td>
<td>46</td>
<td>50</td>
<td>151</td>
<td>151</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>-4</td>
<td>29</td>
<td>-58</td>
<td>14</td>
</tr>
</tbody>
</table>
Table ES4. Annual benefits from choice modeling survey (millions of USD)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>8.8</td>
<td>17.4</td>
<td>9.0</td>
<td>17.6</td>
</tr>
<tr>
<td>Jordan</td>
<td>6.0</td>
<td>8.9</td>
<td>6.7</td>
<td>9.6</td>
</tr>
<tr>
<td>Palestine</td>
<td>4.0</td>
<td>7.2</td>
<td>4.7</td>
<td>7.9</td>
</tr>
<tr>
<td>Total Benefits</td>
<td>18.8</td>
<td>33.5</td>
<td>20.4</td>
<td>35.1</td>
</tr>
<tr>
<td>Annual Costs</td>
<td>46</td>
<td>50</td>
<td>151</td>
<td>151</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>-27.2</td>
<td>-16.5</td>
<td>-130.6</td>
<td>-115.9</td>
</tr>
</tbody>
</table>

Table ES5. Annual benefits from TCM survey (millions of USD)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>0.96</td>
<td>7.08</td>
<td>10.85</td>
<td>49.48</td>
</tr>
<tr>
<td>Jordan</td>
<td>3.59</td>
<td>8.51</td>
<td>11.73</td>
<td>44.03</td>
</tr>
<tr>
<td>Palestine</td>
<td>1.38</td>
<td>5.88</td>
<td>8.63</td>
<td>17.21</td>
</tr>
<tr>
<td>Total Benefits</td>
<td>5.93</td>
<td>21.47</td>
<td>31.21</td>
<td>110.72</td>
</tr>
<tr>
<td>Annual Costs</td>
<td>46</td>
<td>50</td>
<td>151</td>
<td>151</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>-40.07</td>
<td>-28.53</td>
<td>-119.79</td>
<td>-40.28</td>
</tr>
</tbody>
</table>

The above benefit estimates included only those from domestic tourists. International tourists were not included in the above analysis as the benefits measured are those accrued by the visitors themselves, and not the state. However, it is important to note that well over 1 million international tourists visit the Jordan River each year. This number can be expected to increase with the rehabilitation of the Lower Jordan. It is not possible from the surveys issued to estimate the expected increase in international tourism as a result of river rehabilitation. What is possible given the existing data is calculation of the number of international tourists that would need to visit in order for benefits to exceed the costs of rehabilitation. The results of such calculations, using total benefits from the TCM and the CVM (use values only) methods are presented in Table ES6. As can be seen, the values range from between 1 to 9.6 million additional tourist days, depending on the scenario and method in question. This does not take into consideration potential benefits for the host countries in terms of money spent by international tourists in the region. Profits from such sales could be considered additional benefits for local governments.

Table ES6. Additional international tourist visits necessary for positive net benefits (million days on all three entities)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCM</td>
<td>4.7</td>
<td>2.3</td>
<td>9.6</td>
<td>2.6 – 3.3</td>
</tr>
<tr>
<td>CVM (use+option values only)</td>
<td>nb*&gt;0</td>
<td>nb&gt;0</td>
<td>8.6</td>
<td>nb&gt;0</td>
</tr>
</tbody>
</table>

* nb>0 indicates the net benefits were positive when evaluating only domestic tourism, and thus no additional international tourists would be necessary to justify the given scenario on economic grounds.
DISCUSSION
As mentioned, the results presented in the previous section vary considerably by valuation method. However, it is clear that benefits from rehabilitation of the Lower Jordan River are substantial. In all cases, the estimated costs are within the range of estimated domestic benefits (Table ES7). A comparison of average benefits (the average of the three methods) to the estimated costs shows that the benefits are roughly equal to the costs for Scenarios 1 and 4 and greatly exceed the costs for Scenario 2, while falling short of the costs for Scenario 3 (Table ES7). Adding the economic benefits associated with international tourists to those of the domestic populations would certainly tip the balance strongly in favor of at least 3 of the 4 scenarios.

Net benefits for all scenarios were positive only using CVM. In this method non-use values accounted for a large share of the benefits and were essential in terms of the scenarios passing a benefit-cost type analysis. Furthermore, when looking at total benefits, the benefits to Jordan alone outweigh the costs. If, however, one takes only the use-value benefits, then only when benefits are pooled do they surpass the estimated costs. That means that regional cooperation, or at least coordination, would be necessary for an economically beneficial rehabilitation project. Such a situation is not surprising given the nature of the shared resources involved as public goods.

With two of the three methods (TCM and CVM) there was a strong preference for quantity of water over quality; i.e., relative to Scenario 1, an increase in water quantity was valued more than an increase in water quality. This was not the case with the choice modeling method. Given inconsistency of the choice modeling results with those of the other two, together with questions raised by some of those surveyed, these results are likely the least reliable of the employed three methods. What is clear, regardless of methodology, is that given a supply of a certain quantity of water, be it 220 mcm/y or 400 mcm/y, additional costs for better water quality are small or even negligible. Thus, should a policy of rehabilitation be pursued, regardless of the flow level chosen, attaining good water quality standards produces higher benefits, and is the economically efficient choice.

It is also important when interpreting the results to remember the self-imposed constraints, limitations and biases built in to the valuation and cost estimations. In terms of the benefits, only in-stream values of the LJR were estimated. Ancillary benefits from the additional water provided downstream, whether it be re-used off-stream or whether it flows into the Dead Sea, are likely substantial, but are not included in the assessment. Thus, true benefits are likely higher. In contrast, cost estimates take the cost of desalination as the marginal cost of water, despite the fact that lower cost options are almost certainly available, and include lost revenues of farmers, rather than lost producer surplus. Thus, the true costs are likely lower. Given these built in biases, the above estimates are conservatively biased against rehabilitation. Therefore, cases in which benefits outweigh costs can be seen as robust.
Table ES7. Domestic Benefits Range

<table>
<thead>
<tr>
<th>Scenario 1</th>
<th>Benefits Range</th>
<th>Benefits Average</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>(220mcm/ moderate quality):</td>
<td>6-90</td>
<td>38</td>
<td>46</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>21-167</td>
<td>74</td>
<td>50</td>
</tr>
<tr>
<td>(220mcm/moderate quality):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario 3</td>
<td>20-197</td>
<td>83</td>
<td>151</td>
</tr>
<tr>
<td>(400mcm/good quality):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario 4</td>
<td>35-349</td>
<td>165</td>
<td>151</td>
</tr>
<tr>
<td>(400mcm/good quality):</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BUSINESS CASE STUDIES
As many of the estimated economic benefits of focus in this study stem from the tourism sector, the consultancies evaluated the economic prospects of several specific tourism sites and initiatives given the prospect of a rehabilitated Lower Jordan River. Six business cases, two from each country, were analyzed for their potential to benefit from a rehabilitated river, assuming freedom of access to all populations to the river banks. All showed significant potential for economic profitability. These cases covered the following sites:

- **The West Bank Baptism Site** – development of the West Bank baptism site, as well as a variety of river related and other family recreational attractions in the vicinity.
- **Fasayil** – development of a variety of river related and other family recreational attractions in the vicinity of the archeological ruins of Fasayil in the West Bank.
- **Karameh Dam** – development of constructed wetlands adjacent to the Karameh Dam in Jordan for purposes of eco-tourism.
- **Sweimeh** – development of tourism sites near Sweimeh along the southern stretch of the LJR in Jordan that would benefit from synergies with Dead Sea tourism nearby.
- **The Peace Island** – development of eco-tourism including water channels and wetlands along the Israeli-Jordanian border at the confluence of the Yarmouk and LJR.
- **Rob Roy Canoeing** – development of river boating and rafting activities along the Israeli side of the northern portion of the LJR.

CONCLUSIONS
This study is a first attempt to analyze rehabilitation of the LJR from an economic perspective. The gaps in knowledge are considerable, and thus, a study such as this serves to frame the debate and provide initial figures from which to evaluate various policy options. The economic benefits of a rehabilitated LJR are shown to be substantial, even when benefits to international visitors are excluded from the analysis. While the costs of such an endeavor are also large, this initial analysis shows that collectively, the benefits to the countries likely outweigh these costs, which would justify rehabilitation purely on economic grounds. The large variation in results between methods indicates that the results should be viewed only as preliminary, and further research including refinement of models is necessary for truly informed policy-making. That said, this study shows that a future LJR that once again flows and hosts a healthy ecosystem may indeed provide economic, as well as ecological, social and cultural benefits.
1. INTRODUCTION

The Jordan River, one of the world’s most famous rivers, has been reduced to a little more than a drainage ditch after years of upstream water diversions and overall neglect. However, given its rich cultural heritage and environmental importance, rehabilitation of the Lower Jordan River (LJR) brings with it the potential for significant cultural, ecological, and economic benefits. Prior to this study, the extent of the potential economic benefits had not been investigated. This Regional Benefits Study is intended to address this gap, and thereby directly benefit Jordanian, Palestinian and Israeli decision makers and stakeholders. Decision makers in the region are tasked with the difficult job of allocating scarce resources in a sustainable manner that maximizes the benefits both for nature and for local communities. This study provides a critical scientific tool to help these decision makers determine how water resources should be returned to the LJR by identifying the net benefits that can be derived from various rehabilitation scenarios. Furthermore, this study’s findings provide decision makers, donors, and regional actors with insight and appraisal of opportunities for development that would result from a rehabilitated LJR.

The study’s central framework is comprised of considerations of tourism development and ecosystem services available to a rehabilitated LJR. The results of this study will be used as an advocacy tool with local communities, municipal authorities, national stakeholders and various actors of the international community to increase political will amongst national decision makers to rehabilitate the LJR.

2. BACKGROUND ON LOWER JORDAN RIVER

The LJR and its tributaries are shared among the nations of Israel, Jordan, Syria and Palestine. It is the longest permanent river in the region, stretching along an aerial distance of 105 kilometers (km), with an actual stream channel length of 217 km from the Sea of Galilee (also known as Lake Tiberius or Lake Kinneret) to the Dead Sea. The river is gently sloped from an altitude of 212 meters (m) below sea level to an altitude of 422 m below sea level. The LJR flowed freely for thousands of years from the Sea of Galilee to the Dead Sea creating a lush wetland ecosystem, rich in biodiversity. This narrow corridor also serves as one of the most important migratory flyways on the planet with an estimated 500 million birds travelling its length twice annually (Turner et al., 2005).

This river has been immortalized in the holy books of Judaism, Christianity and Islam with references associating the river to prophets Moses and Elijah. Several shrines marking the burial places of the Companions of the Prophet Mohammed are located along the eastern bank of the LJR and for Christianity the river water is itself considered holy following the baptism of Jesus in the Jordan River. Unlike any other river on earth, the LJR remains an important cultural anchor for half of the world’s population. The Jordan River Valley served as a pathway of early human migration out of Africa, was a site of early human settlement, hosted momentous battles throughout the Roman period and crusades, and was the location for magnificent cities and castles. The rich history of the Jordan River valley warrants its inscription as a ‘cultural landscape of universal significance’ (Turner et al., 2005).
Politically, the LJR can today be divided into three sections; from the Sea of Galilee to the confluence with the Yarmouk River in which both sides of the LJR flow through Israel; from the entrance of the Yarmouk River into the LJR to Bezeq Stream in which the LJR serves as the border between Israel and Jordan; and from Bezeq Stream to the Dead Sea in which the LJR serves as the border between the Palestinian West Bank and Jordan. The rehabilitation of the river can in principal be addressed in stages; although a comprehensive approach adopted by the governments of Israel, Palestine and Jordan together would be the most beneficial and efficient strategy for the long-term management of the LJR. A regional approach to managing the LJR can further serve as an effective forum for peace building; enhancing dialogue, building confidence, exploring shared interests, and broadening cooperation between the parties.

Descriptions from early explorers such as United States Naval Lieutenant Officer W.F. Lynch in his 1847 expedition down the Lower Jordan River to the Dead Sea, describe heroic navigations down cascading rapids and waterfalls. Likewise, until the second half of the 20th century the wild waters of the Jordan River turned the turbines at the hydroelectric power plant located at the confluence of the LJR and the Yarmouk – bringing power to thousands of residents on both sides of the river.

Though still unique in its natural and cultural wealth the “mighty Jordan” has been reduced to a trickle south of the Sea of Galilee-devastated by over-exploitation, pollution, and a lack of regional management. According to recent studies conducted by Yale University, this important regional water resource carried an average of 1.3 billion cubic meters of fresh water from the Sea of Galilee to the Dead Sea every year until the 1930s (Anisfeld, 2009). Beginning in 1932 with the construction of Degania dam at the Jordan River’s exit from the Sea of Galilee, the process of regulating the flow of the LJR began in earnest.

From 1946 to 1964, the river’s flow regime was modified through interventions to prevent winter flooding, greatly reducing flow variability. In 1964 and 1966, Israel and Jordan undertook major national water infrastructure projects to divert water of the LJR and its tributaries for domestic and agriculture use through the construction of the Israeli National Water Carrier and the King Abdullah Canal, respectively. Furthermore, the Israeli saline water carrier was constructed to improve water quality in the Sea of Galilee by diverting saline streams, which once flowed into the Sea of Galilee into the LJR, causing a large increase in the LJR’s salinity.

With the near complete blockage of fresh water flow into the LJR from the Sea of Galilee by Israel, the Yarmouk River, historically the LJR’s second largest tributary, became the LJR’s main source of fresh water. As a final assault to the LJR’s natural structure and function, Jordan and Syria completed the construction of the Unity Dam on the Yarmouk River in 2007, capturing the majority of the Yarmouk’s flow and further reducing the LJR to 20-30 million cubic meters (mcm)in 2009 (Gafny et al., 2010)– less than 5% of its natural flow.

Compounding the drastic reduction of fresh water to the LJR, sewage from communities along both sides of the river has been discharged into the LJR continuously until recent years with dramatic effects on the river’s health (Holtzman, 2003).

The LJR will only be successfully rehabilitated if the countries that border it put in place cooperative agreements and mechanisms. In addition, the agreements already established by
The health of the LJR has a major impact on the state of the Dead Sea: the terminal lake of the river and lowest place on earth. The level of the Dead Sea has been dropping by over one meter each year. Decreasing water levels are primarily due to water diversion from the LJR—the main water source for the Dead Sea — coupled with the industrial solar evaporation ponds maintained by the Dead Sea Works and the Arab Potash Company for mineral extraction. The Dead Sea has already lost over one-third of its surface area and continues to decline annually (Abu Taleb et al., 2010). Rehabilitation of the LJR would significantly contribute towards the rehabilitation of the Dead Sea.

With regards to the discharge of waste into the LJR, the Israeli, Jordanian and Palestinian governments are currently taking steps to significantly reduce the flow of untreated sewage into the LJR including the upcoming activation of several new sewage treatment plants in the Jordan Valley. In Israel, a plant was completed in the community of Beit Shean to treat the sewage of all of the residents of Beit Shean City, the Valley of Springs Regional Council and the Gilboa Regional Council. The Jordan Valley Regional Council, also in Israel, is nearing completion of a new plant that will treat the sewage of Tiberias and other Sea of Galilee communities. Likewise, in Jordan, North Shuna, the largest community on the eastern side of the valley, has broken ground on a new treatment center that will treat sewage collected in cesspits rather than allowing the effluents to seep into the ground and pollute the springs which flow into the Lower Jordan River. Furthermore, the Palestinian Authority has endorsed a cooperative agreement with the Japanese International Cooperation Agency to finance the construction of a wastewater treatment
center in Jericho. With the completion of these centers, all major sources of sewage will be removed from the Lower Jordan River.

While these are indeed major achievements, they will also remove a large percentage of the effluent flowing in the LJR today, making a coordinated regional effort to return fresh water resources to the Lower Jordan River even more critical. To date, the Israeli Ministry of Environment has taken a first step in this direction by directing the allocation of 30 mcm per year of high quality water to be returned to the LJR upon the completion of the new Jordan Valley Regional Council wastewater treatment center and desalination of part of the saline water carrier.

The equitable sharing of the Jordan River Basin water resources between people and nature and amongst all of the river’s riparian stakeholders, including Palestinians presently denied from extracting any water directly from the river, is no less an important issue. As a riparian to the river, Palestine must have direct access to the river and is entitled to a share of the river’s waters. This issue is specifically addressed in Friends of the Earth Middle East’s revised Model Water Agreement between Israel and Palestine entitled "An Agreement to Share Water between Israelis and Palestinians” (FoEME, 2012).

The obligation to return water to the river must take into account the quantity of water diverted by each country in addition to socio-economic differences between the parties. As such, FoEME places responsibility with Israel to return a higher percentage of water towards the river's rehabilitation, in proportion to the large share of the LJR's water that has been diverted by Israel and in consideration of Israel's high economic and environmental capacity relative to the other riparian countries. The governments of Jordan and Syria also have a responsibility to return water to the river. FoEME recommends that 400-600 mcm/y of fresh water should flow in the LJR, with 220 mcm/y contributed by Israel, 100 mcm/y contributed by Syria, and 90 mcm/y contributed by Jordan. Palestine should not be asked to contribute water as it currently does not receive water from the LJR. Given that Syria is an upstream user of the headwaters, but is not a riparian to the LJR, some type of compensatory arrangement would likely be necessary to induce cooperation. Israel, Jordan and Palestine will need to work together to ensure that water returned to the river is not illegally extracted by farmers and others along its banks.
3. CURRENT LEGAL AND POLICY FRAMEWORKS, INSTITUTIONAL CONSTRAINTS AND NECESSARY ENABLING CONDITIONS

3.1. Jordan

Current legal framework

The Ministry of Water and Irrigation (MWI) is the official body responsible for the formulation of national water strategies, policies and planning and is subject to approval by the Council of Ministers. The ministry has been supported by several donor organizations, from several inter-governmental aid agencies, as well as various regionally-based development funds (Ministry of Water and Irrigation (Jordan), 2008). The Water Authority of Jordan (WAJ) and the Jordan Valley Authority (JVA) are the two key agencies in the water sector and both fall under the authority of the Ministry of Water and Irrigation. The WAJ is in charge of water and sanitation service provision directly and through public companies it owns. The WAJ is also responsible, together with the Ministry, for water resources planning and monitoring and regulates water abstraction by all users. It thus combines both regulatory and service provision functions. The Jordan Valley Authority is entrusted with the integrated socio-economic development of the Jordan Valley. During the last 30 years, the JVA completed numerous infrastructure projects in the Valley and has the mandate to carry out integrated socio-economic development in the Jordan Valley area (Ministry of Water and Irrigation (Jordan), 2008). The Yarmouk River is the country’s primary surface water source, with the other resources coming primarily from groundwater. As a result of the 1994 Israel-Jordan Peace Treaty, some Yarmouk river water is also stored seasonally in the Sea of Galilee (Lake Tiberias/ Kinneret), being conveyed through a pipe.

Current and future policies

In 2009 King Abdullah gave his approval for a national water strategy 2008-2022, a clear indication of the importance of long term planning instruments. Jordan’s Water Strategy 2008-2022 includes investments of Jordanian Dinar 5.86 billion (USD 8.24 billion) over a period of 15 years. It also foresees a decreasing reliance on groundwater from 32% in 2007 to 17%, increased use of treated wastewater in agriculture from 10% to 13% and increased use of desalination from 1% to 31% (Ministry of Water and Irrigation (Jordan), 2009).

The country’s priority regarding water allocation is to first meet basic human needs (100 liters per capita/day). The allocation of water to the tourist sector is of secondary priority, followed by industrial demands. It is expected that Jordan’s tourism market will grow progressively, including in the LJR region. Jordan’s strategy to facilitate the development of the tourism sector in the Jordan River Valley is to improve coordination and cooperation among all concerned ministries - including Planning, Water and Irrigation, Agriculture, Environment, Tourism, Industry and Trade, and Health - on policy, economic, and social concerns related to water issues. Effective coordination between mentioned bodies will also enable environmental assessment and mitigation of potential adverse impacts of the expected increase in tourist numbers.
Although agricultural activities consume 65% of the total water supply of the country, the sector accounts for only 2.7% of current GDP and employs between 3-6% of the workforce (World Bank, 2012). Furthermore, water invested in agriculture generates a much lower return on investment than water used in tourism or industry: a return of only 0.30 JD per cubic meter, as compared to a return of 20 and 40 JD in tourism and industry, respectively. These significant imbalances suggest that a change in policy could have a substantial effect on both water availability and national wealth. (Denny, Donnelly, et al. 2008)

**Current Limiting Factors**

**Water scarcity**
Jordan suffers from severe water scarcity. This is compounded by high population growth (2.1% annually), increasing living standards, and the impact of climate change. Current demand already exceeds the available water resources. The present water budget has a deficit of 20% (Ministry of Water and Irrigation (Jordan), 2009), dealt with by over-pumping from aquifers.

**Movement and access**
The LJR riparian zone to a large extent forms the border between Jordan, Israel and Palestine. The area has strategic military purposes and therefore access is limited. The fact that much of the riparian-zone is allocated to agriculture adds to the inaccessibility of the area by local and visiting tourists.

**Institutional constraints**
Several institutional constraints currently impede sustainable water management, including:
- Non-revenue water is over 50% in many regions of the country.
- Low tariffs that do not cover total costs and weak accounting systems.
- A lack of cohesiveness and integration among responsible regulatory agencies.
- A lack of stakeholder involvement in the decision making process.

**Financial constraints**
One of the main challenges remains to attract private sector donor funding, especially in the current financial climate.

**Enabling Conditions**
The following are necessary conditions for the successful rehabilitation of the Lower Jordan:

**Long-term planning and strategy**
As stated above, a comprehensive, long-term water strategy that facilitates access to information and improved coordination and cooperation between sectors is crucial for adequate water governance. Economic and political stability are also critical.

**Human resources**
Jordan’s water strategy stresses the importance of improving capabilities of human resources in the management of water through better vocational and technical training as well as ongoing professional education. Investment in a workforce that is trained in the provision of services, especially tourism related services is also important for development of high quality eco-tourism.
Law enforcement
Enforcement of existing laws regarding water quotas and illegal tapping of groundwater sources is essential. This may possibly include the transfer of authority from Water Ministry officials to law enforcement officials.

Water tariffs
In Jordan’s Water Strategy 2008-2022 (Ministry of Water and Irrigation (Jordan), 2009) water tariff mechanisms are mentioned as an enabling condition to promote cost recovery of water projects. Such a situation creates a relative advantage for tourism (and industry) compared to agriculture as mentioned above. Enforcement of higher tariffs will not only generate income, but will also stimulate investment in water conservation.

Tax incentives
Additional tax exemption for eco-tourism in the LJR would need specific legalization, a rather complex and long-lasting bureaucratic process. A set of investment privileges that increase the competitive investment climate within the development areas are provided by the Development Areas Law N°(2) (Figures 2008). Precedent for such incentives is already found in investments in the Dead Sea Development Zone, which already benefits from certain tax exemptions. Similar incentives would be necessary for the LJR.

3.2. Palestine

Current legal framework
Despite being a riparian to the Jordan River, the Palestinian Authority (PA) has no direct control over the Lower Jordan River itself and little over the surrounding riparian zone. As a result of the Interim (Oslo I and II) Agreements, and the agreement on the handover of responsibilities between the Palestine Liberation Organization and the government of Israel, the Jordan Valley was divided to 3 different categories of land, security and civil administration. Only 11% of the Jordan Valley was fully handed over to the PA’s civil and security administrative responsibility, including land registration, licensing of right of establishment, both commercial and residential (Area A). Another 2% of the Jordan Valley, which fell under Palestinian Authority civil administration, including licensing of establishments and residential zoning (Area B), security control for which was kept to the Israeli Army. The remainder (Area C) is under full Israeli control. This division has resulted in a serious problem for Palestinian development potential in the Jordan Valley, whereby any establishment that is to be created (whether residential or commercial) must receive its licensing and building permits from the Israeli Ministry of Defense’s Civil Administration. This does not function in accordance with the PA’s development plans, and causes tremendous delays and costs to development plans. Furthermore, access to the river by Palestinians is limited, and thus, there is little domestic Palestinian tourism or other use of the river.
Current and future policies

Considering the limited land area in which the PA is capable of enforcing its policies within the Jordan Valley, the PA has invested a great deal of effort in developing policy frameworks aimed at potential economic development, as well as residential expansion in the Jordan Valley. The PA has long considered the Jordan Valley as both the area of potential expansion in residence, for the absorption of the growing population of Palestine, as well as industry. Also, the Jordan Valley has been envisioned as a potential “bread basket” for the West Bank. As such the PA has undertaken the development of several plans for development of agriculture, industry and tourism in the Jordan Valley. This has led to the PA’s directing of donor funding and investment into the Jordan Valley, for example, the Japanese funded program of the “Corridor of Peace and Prosperity”, which aims to provide basic infrastructure to operate an industrial zone and to create more tourist attractions in the Ghor region.

Current Limiting Factors

A large number of factors limit the Palestinians from garnering benefits from the Lower Jordan River:

Movement and access
Palestinians face difficulties in movement and access to resources and land due to the Israeli military presence and procedures. According to one report “The Jordan Valley is one of the most restricted areas on earth” (PalTrade 2010).\(^1\) As documented by the UN Office for the Coordination of Humanitarian Affairs (UNOCHA), all routes leading into the Jordan Valley north of Jericho are tightly controlled by four permanently staffed checkpoints, which prohibit the access of private Palestinian vehicles to the area, unless they are Jordan Valley residents. The impact of these limitations has seriously impeded the development of Palestinian tourism. The inability of the Palestinian people to reach the Lower Jordan River without passing by an Israeli military checkpoint, which increases both the cost and time needed to arrive, has discouraged visits to the area. As a result, the investment in the area has gone down in priority for both the Palestinian government and the private sector.

Lack of policy
As a result of the current land control and civil administration, as well as the security situation in the Jordan Valley, very little policy making and implementation space is left for the PA.

Financial Constraints
Israeli policies in the Jordan Valley, including the encouragement and subsidization of settlement activities on land usurped from the Palestinian population, have discouraged investment and caused capital flight from the area. In addition, the cost of land in area “A” is exorbitantly high due to the small percentage of Jordan Valley Land which is under PA control, thereby rendering

\(^1\) These practices are in flagrant violation of Israel’s obligations, as an occupying power, under international law and international humanitarian law (PLO 2011). International law considers all settlements illegal. Article 49 of the Fourth Geneva Convention Relevant to the Protection of Civilians in Times of War (1949) prohibits the transfer of the occupier’s population to the occupied territory. Over the years, the United Nations has adopted several resolutions reiterating the illegality of Israeli settlements in the OPT. The United Nations General Assembly confirms on a yearly basis the applicability of the Fourth Geneva Convention of 1949 to the OPT.
all area “A” as very high cost land ownership area. Area “B and C” are not as interesting to investors, for various reasons, including the lack of assurance that licensing and building permits will be issued. The high risk, due to potential political instability, has also reduced the chances of making the government turn to the private sector (both local and foreign) because of the inability to guarantee compensations in case of a political rift between Palestinians and Israelis that will cause investment losses. In addition, the PA government works with a very limited budget that allows for few short or long-term development projects. In considering the high cost of the rehabilitation of the LJR, it is likely that the Palestinian government will always rely on the international community for funding of such projects.

Cultural constraints
The rehabilitation process can face several challenges stemming from the potential resistance of the local, largely agricultural populations that currently reside in the Jordan Valley, to any change in their community. According to several Palestinian officials, both the Palestinian community living in the LJR and some Palestinian government personnel think of the LJR area as an agricultural area and that the water resources must be utilized to develop agriculture and not for environmental or tourism purposes. In addition, a high percentage of the Palestinian community is not exposed to environmental activities in general, and has little experience with the LJR in particular.

Lack of infrastructure
Infrastructure serving the Palestinian population of the Jordan Valley and integrating the valley with the rest of the West Bank is underdeveloped. Indeed, “since 1967 Israel has devised and implemented systematic measures aimed at ensuring absolute control over the region and isolating it from the rest of the West Bank” (PalTrade 2010).

Enabling Conditions
The following are necessary conditions for the successful rehabilitation of the Lower Jordan:

Freedom of access and movement
In order for Palestinians to truly reap the benefits of a rehabilitated Jordan River, they need free access both to visit the sites and to develop and manage businesses with little fear of political interference.

Long-term planning and strategy
Because of the current situation, little comprehensive long term planning has been undertaken for the Jordan Valley by the PA. Planning will need to go beyond the project level and become more integrative across sectors and areas.

Financial support
While individual development projects show potential for profitability, additional financial support for infrastructure projects (new roads, utilities, etc.) would be necessary. Given the limited budget of the PA, international donor funds would be sought. Financial guarantees by the international community would likely be necessary in order to reassure investors. Other economic incentives to encourage investment and reduce financial risk would also help reduce investor fears.
Human resources
Investment in a workforce trained in the provision of services, especially tourism related services is also important.

Awareness raising
Given the relative lack of environmental awareness, together with a lack of personal experience with the LJR, major awareness and marketing activities would also be necessary to ensure that the Palestinian population benefits from rehabilitation of the LJR.

3.3. Israel

Current legal framework
The Sea of Galilee (known in Israel as Lake Kinneret), is Israel’s only lake and is the primary source of water for the National Water Carrier. A dam near Degania, at the lake’s southern outlet, maintains water levels, thereby restricting the natural flow into the LJR. In addition, in order to maintain lower salinity levels in the lake, naturally saline springs in and around the lake are diverted by canal from their sources and channeled into the LJR near its northern end, reducing the water quality that is already damaged due to low flows. In addition, agricultural runoff and municipal wastewater disposal further contributes to poor water quality.

According to Israel’s Water Law of 1959, government has a responsibility to manage the country’s water resources for the public good, and to maintain the quality of the sources. The Streams and Springs Authorities Law of 1965, empowers the state to create an independent Authority to coordinate the oversight of activities to protect a stream or river, but it has rarely done so, and has not in the case of the LJR.

In terms of institutional responsibility for the LJR, the Water Authority is responsible for all water allocations. (Water to agriculture and large industries are by allocation. Water for domestic use is not restricted and is managed primarily by pricing.) An amendment to the Water Law in 2004 officially added nature as a legitimate beneficial use of water, allowing for increased allocations of water for in-stream environmental flow purposes. The Ministry of Environmental Protection oversees water quality in aquatic ecosystems, and coordinates all stream restoration projects. In addition, there is an inter-agency Stream Restoration Administration that meets on an ad hoc basis. At the sub-national level, several local authorities have jurisdiction over activities that affect the quality and/or quantity of water in the LJR, as well as activities along its banks. In addition, the Civil Administration has legal responsibility for all activity along the LJR within the West Bank.

Policies plans concerning the LJR
A relatively new sewage treatment plant in the Beit Shean area is expected to improve water quality in LJR. In principle, municipal wastewater is treated and sold to local farmers, however, the plant has suffered from financial woes and the level and reliability of its continued operation is in question. Another sewage treatment plant is currently under construction to treat the waste of the city of Tiberias and surrounding areas. While this will reduce the inflow of pollutants into
the LJR, given that sewage represents a significant portion of the flow of the River, benefits to the River would accrue only if the treated wastewater used by farmers is in place of pumping of freshwater from the River, or, alternatively, if additional water is allocated to compensate for the reduced inflows. A government decision to allocate 30 mcm/y of water to the LJR, largely to replace reductions in saline and sewage waters that have flowed into the River in recent years, has yet to be implemented. In addition, the Israeli government has commissioned a master plan for the northern stretch of the LJR from the Sea of Galilee to Bezeq Stream. This project, currently still in development, is being undertaken independently of the efforts of Friends of the Earth Middle East to develop a regional rehabilitation plan.

**Current Limiting Factors**
Currently factors limiting the rehabilitation of the LJR from the Israeli side include the high costs of alternative sources of water, political opposition from various parties that would see reduced water allocations, and lack of coordination between different governmental bodies at various levels. The amounts of water that the government has already pledged to the LJR will not be sufficient for significant ecological improvement. Israel is developing desalination capacity, but is doing so along the coastal areas and currently does not provide water to the Jordan River Basin region. While future desalination capacity would allow for increased flows (by reducing intake into the National Water Carrier from the Sea of Galilee) without reducing water consumption levels for other sectors, currently that is not possible. In addition, there are public perception issues, with some among the public and among policy makers still viewing water in the LJR as an illegitimate use of a precious resource. In terms of maximizing the recreation potential of the area, the summer and early fall bring very hot temperatures to the region and this curtails its desirability as a summer vacation destination, especially for Israeli domestic tourists. Unlike their Jordanian and Palestinian counterparts, these tourists have multiple alternative options for local water-based tourism, including nearby in the Upper Jordan River and the Sea of Galilee.

**Enabling Conditions**
Rehabilitation of the LJR will come at some cost to the agricultural sector in the LJR basin, either in terms of reduced allocations, or by paying for treated wastewater, or by paying more for water from other sources. If the government wishes to avoid imposing such costs, it will have to develop some type of compensation package for the farmers. Furthermore, it will need to address the issue of the saline spring diversions, various plans for which are currently being considered. Given alternative water-based tourism options in the region, a significant marketing campaign will also likely be necessary.
4. BACKGROUND ON NON-MARKET VALUATION AND LITERATURE REVIEW

Rehabilitation of the Lower Jordan River (LJR) involves numerous economic costs and benefits, including some that are more easily measured, such as the cost of infrastructure needed, and those that are more difficult, such as the value of ecosystem services. In this study we employ multiple methods to value the benefits of rehabilitation of the LJR and compare them to the opportunity costs of the water (i.e., the value of the water as it is currently used). This section provides a general background on non-market economic valuation methods as well as a review of some of the past such studies conducted on aquatic ecosystems in the region.

4.1. Non-market Valuation Methods and Critiques

Environmental services and improvements thereof, are what economists call “nonmarket goods”, to indicate that these are not purchased directly, as are typical commodities. For market goods, welfare effects are tracked by changes related to associated changes in prices. As there are no clear markets for public goods and environmental services, estimation of the economic welfare they provide cannot be made from direct observations of transactions of the goods in question.

There are two main types of valuation methods by which these potential welfare effects can be estimated: 1) Revealed preference methods and 2) Stated preference methods.

4.1.1. Revealed Preference Methods

Revealed preference approaches involve estimation of value for environmental/recreational goods from observations of behavior in the markets for related goods (Freeman, 2003). Effectively, it is assumed that the economic value, i.e., potential welfare effects, are reflected in changes in the marginal willingness-to-pay for related goods and services that are more easily measured. For instance, change in quality of a river may affect the price of real-estate in neighboring areas.

One of the more popular revealed preference methods, and one used in this study, is called the Travel Cost Method (TCM). The TCM seeks to measure the economic benefits of outdoor recreation by estimating how changes in the environmental quality of a site are likely to affect visitation rates. While visitors may not necessarily pay an entrance fee to visit a site, the TCM assumes that the travel and time-related costs of a recreational trip are an implicit part of the trip’s overall cost. From this information, it is possible to estimate demand for travel to the site, and from this, to calculate net economic benefits provided by site recreation.\(^2\)

Limitations of the TCM include its inability to capture non-recreational values and values of those not visiting the site in question. In order to capture such values, other methods are necessary, as will be discussed in the following paragraphs.

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\(^2\) Economists tend to measure benefits in terms of consumer surplus – i.e., the consumer’s willingness to pay (demand) for a good or service less the actual amount expended to obtain such a good or service.
4.1.2. Stated Preference Methods

The stated preference approach to valuation involves derivation of values for environmental goods from responses to questions about preferences for the good/service (Freeman, 2003). Typically, stated preferences are garnered via survey-based studies that ask respondents to reveal information about their preferences or willingness to pay or accept compensation for an environmental good or service. As opposed to revealed preference methods, which rely on measurement of actual behavior, stated preference methods rely on declared preferences. The primary benefits of stated preference models include their ability to assess total economic value (as opposed to just recreational value or land-use value, etc.), including both use and non-use values. Non-use values include economic benefits by persons not directly consuming the good or services, such as satisfaction from knowing that a good exists or that it is available for future use and for future generations (Krutilla, 1967). In addition, stated preference methods allow for valuation of future changes in provision of environmental goods or services. Revealed preferences do not.

The reliance on declared willingness to pay for goods or other stated preference methods has left them open to some criticism among some economists and others (e.g., Diamond and Hausman, 1994), despite the fact that they have been successfully employed for decades in the fields of product marketing. A U.S. government panel chaired by Nobel Prize winning economist Ken Arrow to evaluate the reliability of stated preference methods determined that their benefits outweigh the risks of inaccuracy (NOAA, 1993), especially given their ability to measure non-use values. The panel offered recommendations for minimizing the potential for unreliable results, such as including reminders of budget constraints, emphasizing the tradeoffs inherent in any choices made, and ensuring user understanding of the scenarios as well as the relevancy of valuation scenarios to the respondents. These have become standard procedure in subsequent stated preference studies.

Two types of stated preference methods were used in this study on the LJR: the Contingent Valuation Methods (CVM) and Choice Modeling (CM).

The contingent valuation method involves directly asking respondents about their monetary valuation over a specific environmental change/improvement (Freeman 1993). Commonly, CVM questions ask respondents to state their willingness-to-pay (WTP) in order to ensure a particular environmental outcome. Typically questions about WTP are either a) open-ended, b) in the form of a payment card (i.e., respondents are provided a range of possible amounts and asked to indicate the amount that best represents their WTP), or c) discrete choice, whereby respondents are asked yes/no questions concerning their willingness to pay a given amount for the hypothetical environmental improvement to occur, and by varying the proposed amount among respondents, it is possible to derive an overall societal demand curve.

Choice modeling is another stated preference valuation method that is applied to estimate the value of hypothetical recreational and environmental goods (e.g. Opaluch et al., 1993; Adamowicz et al., 1994; Hanley et al., 1998; Morrison and Bennett, 2000). In the application of CM, survey respondents are presented with a series of choice sets, each containing options of goods with different attributes (e.g. different levels of quality), with each associated with a given cost. Respondents are asked to choose their preferred alternative from among those offered in
the set. Attribute levels are varied from one alternative to the next in an experimental design (for a review, see Bennett and Blamey, 2001). The respondents’ choice patterns among alternatives determine the values placed on the environmental attributes.

An advantage of CM vis-à-vis CVM is that the former does not rely on direct declarations of WTP, but rather, discerns the WTP based on the preferences of the respondents given various costs for obtaining given attribute levels. As such, relative to CVM, choice modeling can provide a more detailed understanding of respondents’ utility functions (Young 2005). In addition, it may reduce the possibility that respondents respond strategically rather than indicating actual preferences (Young, 2005), as it is difficult for subjects to behave strategically when they must choose among several different situations and make tradeoffs.

A criticism of stated preference methods is that they depend upon the accuracy with which the scenarios for valuation are developed. Also, numeric response opinions need to be considered and developed carefully. Open-ended WTP questions, for instance, are often unfamiliar to respondents and can lead to a large share of unrealistic answers, while payment card or discrete choice models have potential for starting point bias (i.e., bias based on the range of prices offered) (e.g. Portney, 1994; Hanemann, 1994; Diamond and Hausman, 1994). Furthermore, like all surveys, responses to stated-preference surveys may be influenced by the answer the respondent feels s/he is supposed to give, rather than a true reflection of preferences. As mentioned above, surveyors are aware of these limitations and take a range of pre-cautions to minimize them.

4.1.3. Combining stated and revealed preference approaches

A great deal of research has been done in the field of applied environmental economics which implements elements of both stated- and revealed-preference approaches in order to mutually validate responses from each method. Several empirical studies that have evaluated the veracity of stated preference models (by, for instance, comparing them with results from revealed preference models) have found them to provide reliable estimates of willingness to pay (e.g., Loomis 1989, Reiling et al. 1990; Tiesl et al. 1995, Carson et al. 1997), although some have found discrepancies between the approaches (e.g., Shechter et al, 1998). In many cases, stated preference data can also be calibrated via revealed preference data over the same non-market good. In this manner, efficiency and accuracy of benefit estimation is improved in both measurements of willingness-to-pay for changes in quality and quantity (e.g., Cameron et al.; Englin and Cameron, 1996; Layman et al., 1996; Huang et al., 1997).

Several studies have combined stated- and revealed-preference approaches in order to take advantage of the strengths and mitigate the weaknesses of each approach. Notably, Whitehead (2000, 2005) has proposed a combined revealed and stated behavior estimation method to measure recreation benefits for a quality improvement. In this method, sometimes dubbed contingent behavior modeling, he starts by estimating the travel and time costs of a recreation trip as the implicit cost of the trip, and then estimating a correlation between the trip costs and trips taken as a measure of quantity. Estimation of changes to quality are often determined via pooled data from recreation sites with different quality levels; correlations can then be made between quality levels and the number of trips taken (e.g. Kaoru et al., 1995; McConnell et al., 1995). The stated preference methods (e.g. choice modeling and contingent valuation) can be
used directly to value quality changes at a single site by presenting respondents with questions of hypothetical quality changes (e.g. Boyle et al., 1993; Carson and Mitchell, 1993).

A major advantage to such a combined revealed and stated approach is that it allows for benefit estimation that extends beyond the scope of historical data, e.g., it allows for estimation of how travel behavior is expected to change under various future scenarios. Such a contingent behavior approach has been proved externally valid when compared to revealed preferences. For example, Loomis (1993) found that intended and actual length of stay were not different given a constant level of lake quality.

4.2. Literature Review

In recent environmental assessments there has been extensive use of a mixed method stated- and revealed-preference approach in order to value transboundary environmental restoration projects. In each study it is evidenced that findings from nonmarket valuation methods are self-reinforcing; by incorporating cultural and ecological values that typically are nonmarket in nature. Here we review some key valuation studies that have valued nonmarket aspects of waterways in Israel, Jordan, and the Palestinian Territories, especially those with a transboundary focus. In general, benefits evaluation that provides market values in addition to cultural indicators provides substantial leverage to supporting projects for restoration and conservation of the areas. In turn, the economic findings suggest that many of these projects, there are major potential for political gains in addition.

Becker and Katz (2006) investigated non-market value of conservation of the Dead Sea basin using both contingent valuation and travel costs methods. The three local populations (i.e. Israeli, Jordanian, and Palestinian) were found to have substantial levels of WTP in order to preserve cultural and environmental heritage in the Dead Sea basin region, and the magnitude of willingness-to-pay was found to be consistent between the two approaches. Such an analysis provides substantial strength to the conservation efforts in the region that up to that point had relied on ethical and ecological arguments (e.g. tourism and wildlife conservation) without a metric of valuation to compare.

Jabarin and Damhoureyeh (2006) examined the recreational patterns of the Dibeen National Park in Jerash, Jordan in order to determine the potential value of the Park. They do a cross-comparison between CVM and TCM conducted via survey to see the value Jordanians place on maintaining and improving the Park. Valuation results from the two methods are mutually-supportive and in turn support the goals of a biodiversity strategy that the Government of Jordan was just launching at the time of the study within the Dibeen and Ajloun regions.

Abramson et al. (2010) looked at the potential for reduced environmental degradation and subsequent health and security threats in areas affected by the Israeli-Palestinian conflict. Using CVM the study found that both Israelis and Palestinians value the water use in similar fashions and have comparable WTP. The authors then took these results as the basis for a cost benefit analysis of various rehabilitation policy options.
In a study of stream restoration in Israel using choice modeling, Barak (2010) found that respondents’ valuation of stream recreational amenities was roughly equally divided between those that are in-stream based (e.g., swimming, fishing, and boating), and those that are based on recreational opportunities along the streams’ banks (e.g., walking trails, picnicking, etc.).

In a more recent study, Becker and Friedler (2012) look at economic benefits of a restoration project that has taken place since the mid-1990s to restore the Alexander-Zeimar basin, which is a trans-boundary river between the Palestinian Territories and Israel that has been used as a sewage outlet since the 1950s. The study supplements a scientific hydrological model with market and non-market valuations through travel costs to estimate conditions a priori and ex-post the restoration plan took effect. The cost-benefit analysis focused on a series of different restoration options versus the current restoration plans. The authors concluded that there is only a positive net benefit to both parties when a complete cleanup of the river occurs.

The studies outlined above demonstrate the use of nonmarket and market methods in order to value nonmarket public goods in the Israeli-Jordanian-Palestinian region. It also emerges that in such valuation studies, it has become common practice to combine stated and revealed preference techniques. It is clear in these studies that the management of public goods to maximize their public benefits is aligned with the public’s willingness-to-pay for such services.

5. METHODOLOGY

In order to estimate the economic value of rehabilitation of the Lower Jordan River, three consultant teams (one from each country), under the coordination of FOEME, administered nearly identical surveys. The surveys explained the current status of the Lower Jordan River. Each then gathered information regarding respondents’ relative preferences for each one of four possible rehabilitation scenarios covering two levels of flow and two levels of water quality. The four scenarios presented are as follows:

- **Scenario 1** – increased flow to 220 mcm/y, roughly 7 times current flow, of moderate quality
- **Scenario 2** – increased flow to 220 mcm/y, roughly 7 times current flow, of good quality
- **Scenario 3** – increased flow to 400 mcm/y, roughly 13 times current flow, of moderate quality
- **Scenario 4** – increased flow to 400 mcm/y, roughly 13 times current flow, of good quality

As the average respondent is unfamiliar with flow and water quality parameters, each scenario was also described in terms of the expected attributes associated with each in terms of recreational opportunities (e.g., boating, swimming, fishing, etc.) and levels of ecological functioning. In order to facilitate understanding, the scenarios were represented by illustrations as well as written descriptions, as depicted in Figure 5.1. Respondents were also able to ask questions for clarification if need be.

Each survey utilized three different methods to estimate WTP for the four scenarios:

a) Contingent behavior Travel Cost Method (TCM)
b) Contingent Valuation Method (CVM)
c) Choice Modeling (CM)
TCM

The surveys explained the current status of the Lower Jordan River and gathered data on respondents’ current use of the Lower Jordan River in order to determine a baseline, for use in the TCM. The contingent behavior TCM approach was used in order to assess future changes in visitation frequency under the different scenarios. Travel cost was assessed by calculating average cost of travel from the area in which the respondents live to the Lower Jordan River as well as a value for time spent at the LJR.

CVM

Respondents were asked to indicate their annual Willingness to Pay (WTP) in order to ensure the rehabilitation of the LJR at the levels indicated in the four scenarios. Respondents were reminded of their budget constraints. The CVM was in the format of a payment card, with options ranging from 0 to 150 shekels for the Israelis and Palestinians and 0 to 30 Jordanian dinar for the Jordanians, with an additional, open-ended option if the WTP was more than 150 shekels/ 30 dinar annually. A series of follow-up questions was presented after the payment card, in order to assess the extent to which responses were indicative of use and non-use values, as well as whether the responses were internally consistent.

CM

Respondents were presented with four choice sets, each containing three possible outcomes – the current status and two of the four rehabilitation scenarios. Each of the two rehabilitation scenarios in each choice set was presented together with an associated price, while the current status was an option available at no additional cost. The respondents were asked to choose their preferred outcome, given the associated price for each of the four choice sets.

A final section of the survey obtained data on relevant socio-economic and demographic variables. This information was used to gauge how representative the surveyed sample was relative to the population.

3 Average travel cost = (average fuel cost) x (average car fuel efficiency) x (distance travelled to LJR).
4 Time was calculated as 25% of average salary multiplied prorated by the average time spent in travel to and from the Lower Jordan River.
<table>
<thead>
<tr>
<th>WATER QUALITY</th>
<th>MODERATE - Partly freshwater</th>
<th>GOOD - Primarily Freshwater</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEDIUM</td>
<td>SCENARIO 1 Water Quantity</td>
<td>SCENARIO 2 Water Quantity</td>
</tr>
<tr>
<td>220 MCM</td>
<td>Ecological Benefits</td>
<td>Ecological Benefits</td>
</tr>
<tr>
<td></td>
<td>SOME improvement over existing situation NOT enough to maintain natural ecosystem</td>
<td>SOME improvement over existing situation LIMITED reintroduction of species.</td>
</tr>
<tr>
<td></td>
<td>Recreational Opportunities</td>
<td>Recreational Opportunities</td>
</tr>
<tr>
<td></td>
<td>LIMITED CONTACT WITH WATER</td>
<td>UNLIMITED CONTACT WITH WATER</td>
</tr>
<tr>
<td></td>
<td>Walking, boating, kayaking,</td>
<td>Walking, boating, kayaking,</td>
</tr>
<tr>
<td></td>
<td>No swimming</td>
<td>and swimming</td>
</tr>
<tr>
<td>HIGH</td>
<td>SCENARIO 3 Water Quantity</td>
<td>SCENARIO 4 Water Quantity</td>
</tr>
<tr>
<td>400 MCM</td>
<td>Ecological Benefits</td>
<td>Ecological Benefits</td>
</tr>
<tr>
<td></td>
<td>SIGNIFICANT improvement over existing situation LIMITED reintroduction of species.</td>
<td>SIGNIFICANT improvement over existing situation SUBSTANTIAL reintroduction of species</td>
</tr>
<tr>
<td></td>
<td>Recreational Opportunities</td>
<td>Recreational Opportunities</td>
</tr>
<tr>
<td></td>
<td>LIMITED CONTACT WITH WATER</td>
<td>UNLIMITED CONTACT WITH WATER</td>
</tr>
<tr>
<td></td>
<td>Walking, boating, kayaking,</td>
<td>Walking, boating, kayaking,</td>
</tr>
<tr>
<td></td>
<td>No swimming</td>
<td>and swimming</td>
</tr>
</tbody>
</table>

Figure 5.1. Schematic illustrating four rehabilitation levels and respective attributes
Survey Administration

Pilot versions of the survey were administered in order to ensure understanding of the materials. Initial versions were adjusted by, for instance, replacing detailed text with shorter descriptions and visuals as displayed in Figure 5.1., above. The final version was tested as well, in order to ensure understanding and in order to ensure that the length was not prohibitive. Upon successful initial outcomes, the final survey version was administered broadly.

The three consultancies administered the survey in various locations throughout their respective countries, in order to capture regionally and socio-economically representative cross-sections of the population. Sites near the Lower Jordan were oversampled in order to capture the population currently visiting the location. Other locations in which the survey was administered included bus and train stations, shopping centers, and other public places. Surveys were administered face to face, with those administering available for clarification questions.

Surveys were reviewed by the consultancies teams. Unfinished surveys were eliminated from the sample. So too were all irrational answers; for instance, when somebody is willing to pay more for an inferior scenario, this is considered irrational in nature. Surveys containing “protest zeros” were also eliminated from the sample. In the end, surveys from 848 local residents and 290 international tourists were included in the sample. The breakdown by country is provided in Table 4.1. below.

<table>
<thead>
<tr>
<th></th>
<th>Israeli</th>
<th>Jordanian</th>
<th>Palestinian</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locals</td>
<td>394</td>
<td>178</td>
<td>276</td>
<td>848</td>
</tr>
<tr>
<td>Tourists</td>
<td>91</td>
<td>101</td>
<td>98</td>
<td>290</td>
</tr>
<tr>
<td>Total</td>
<td>485</td>
<td>279</td>
<td>374</td>
<td>1138</td>
</tr>
</tbody>
</table>

An initial attempt to administer at least some of the surveys online proved unsuccessful, with low response rates. Results from the few successfully completed surveys were included in the overall analysis.

“Protest zeros” are a phenomenon in which the respondent indicates that the environmental good or service is indeed important to them, but indicates no willingness to pay for such (Freeman, 2003). A lack of WTP may stem from a number of reasons, including a feeling that another party is responsible or a lack of belief that the payment would actually result in the outcomes described. Whatever the rationale, such protest zeros are problematic in that it is not possible to translate the respondent’s utility into WTP. As such, such responses were omitted from the calculations of overall WTP.
6. RESULTS

This section presents the results of the non-market valuation studies for the various rehabilitation scenarios examined, as well as a comparison of these benefits to the associated costs of implementation. First, the results of the three methods of non-market valuation are presented. Only a summary of the results is presented herein. This is followed by a description of the calculation of the costs of implementation, which covers the opportunity cost of the water, as well as the infrastructure and operations and maintenance necessary to deliver the water at the specified quality. Finally, a comparison of benefits and costs is presented.

6.1. Benefits from Non-market Valuation

6.1.1. Contingent behavior Travel Cost Method (TCM) Results

For all four rehabilitation scenarios examined, estimated visitation rates among all three populations are expected to rise. Table 6.1 shows the expected change in visits per capita as well as the expected increase in consumer surplus (a measure of economic welfare) per visit for each of the three populations for each of the four scenarios (S1-S4). International visitors are not included in this estimate in order to highlight changes in economic welfare to the population of the countries in the region. As such, they should be seen as a lower bound estimate of actual economic benefits.

Table 6.2 shows the total national level annual economic benefits for each scenario. On a per visit level of analysis, unsurprisingly, Scenario 1 (lower flow and lower quality) generated the least amount of benefits for each, while Scenario 4 (higher flow and higher quality) generated the most (Table 6.2). The benefits differ greatly both across scenarios and across populations, however, for all three populations there seemed to be a preference for higher water flow, even at the expense of lower quality, as indicated by the higher benefits for Scenario 3, relative to Scenario 2. The demand curve for an improved Lower Jordan River is highly non-linear for all populations, with a significant jump in benefits from Scenario 3 to Scenario 4. This indicates that the populations do value increased ecological functioning and/or better water quality that allows for full human contact with the water.

Estimated Palestinian benefits on a per visitor level are significantly higher than those estimated for either Israelis or Jordanians. While several possible explanations can be surmised to explain such a result, the difference is most likely due to the current restrictions on movement and access to the site. In using a contingent behavior method, the survey estimated the expected increase in visitation, assuming freedom of access. Since current access is restricted to most of the Palestinian population, it is likely that much of the value is reflective simply of having access to visit the site. Thus, in this case, while the relative differences between scenarios are instructive of economic benefits, the absolute values may not be directly comparable to those of Israelis and

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7The regression equations and results of the regressions used to calculate these figures are available upon request.
Jordanians, for whom access is less of an issue. At a national level, the Palestinian results are not higher than those of the other two populations, given the smaller population.8

Table 6.1. Change in annual visits per capita (VPC), visits (in thousands), and consumer surplus (CS) per visit (in USD)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>0.21</td>
<td>0.41</td>
<td>0.68</td>
<td>1.53</td>
</tr>
<tr>
<td>ΔVisits</td>
<td>322.1</td>
<td>639.5</td>
<td>1,061</td>
<td>2,387</td>
</tr>
<tr>
<td>ΔCS</td>
<td>2.98</td>
<td>11.07</td>
<td>10.23</td>
<td>20.73</td>
</tr>
<tr>
<td>Jordan</td>
<td>0.82</td>
<td>1.87</td>
<td>1.87</td>
<td>4.21</td>
</tr>
<tr>
<td>ΔVisits</td>
<td>983.5</td>
<td>2,160</td>
<td>2,243</td>
<td>5,015</td>
</tr>
<tr>
<td>ΔCS</td>
<td>3.65</td>
<td>3.94</td>
<td>5.23</td>
<td>8.78</td>
</tr>
<tr>
<td>Palestine</td>
<td>0.54</td>
<td>1.01</td>
<td>1.39</td>
<td>2.73</td>
</tr>
<tr>
<td>ΔVisits</td>
<td>248.2</td>
<td>464.8</td>
<td>638.7</td>
<td>1,256</td>
</tr>
<tr>
<td>ΔCS</td>
<td>5.55</td>
<td>12.65</td>
<td>13.51</td>
<td>13.70</td>
</tr>
</tbody>
</table>

Table 6.2. Annual benefits from change in visitation in annual terms (millions of USD)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>0.96</td>
<td>7.08</td>
<td>10.85</td>
<td>49.48</td>
</tr>
<tr>
<td>Jordan</td>
<td>3.59</td>
<td>8.51</td>
<td>11.73</td>
<td>44.03</td>
</tr>
<tr>
<td>Palestine</td>
<td>1.38</td>
<td>5.88</td>
<td>8.63</td>
<td>17.21</td>
</tr>
<tr>
<td>Total</td>
<td>5.93</td>
<td>21.47</td>
<td>31.21</td>
<td>110.72</td>
</tr>
</tbody>
</table>

Figure 6.1. Annual benefits from increased visitation (TCM survey) (millions of USD)

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8 The population included for calculations was that of the West Bank (including East Jerusalem) only. It did not include that of the Gaza Strip.
6.1.2. Contingent Valuation Method (CVM) Results

Results of the CVM section of the survey indicate significantly higher economic benefits from the various restoration scenarios. Table 6.3 presents the annual benefits for each country, as well as the collective total benefits of the region (the three countries together) from the CVM survey. These figures are presented graphically in Figure 6.2. Again, these figures include only values from domestic populations, and thus should be viewed as lower bound estimates.

As with the TCM results, respondents value both quantity and quality, but indicate a clear preference for the amount of water flowing in the river over the difference in water quality. The benefit levels are substantially higher than the corresponding results from the TCM contingent behavior survey as reported in the previous section. As noted earlier, because CVM captures both use and non-use values, it should not be surprising that the results for CVM are higher.

Figures for Jordanian benefits are the highest. Possible explanations for differences between methods will be discussed more at length in the Discussion section of this paper, however, the result is likely due to the primary role the Jordan Valley plays in Jordanian recreation, relative to Israeli, which has many more popular recreational options, and relative to Palestinian, for which the majority of the population has limited experience with the Jordan Valley due to travel restrictions.

From questions included in the survey, it was possible to distinguish between use and non-use values in the CVM results. Total WTP for each of the scenarios and each of the countries is divided roughly equally between use and non-use values, as depicted in Table 6.4. For this calculation, option values – i.e., the value of maintaining the option of utilizing the river in the future, were included as use values. From analysis of the differences between use and non-use values it seems that use values account for slightly less than half of total value.
Table 6.3. Annual benefits from CVM survey (millions of USD)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>33</td>
<td>64</td>
<td>78</td>
<td>134</td>
</tr>
<tr>
<td>Jordan</td>
<td>47</td>
<td>84</td>
<td>98</td>
<td>170</td>
</tr>
<tr>
<td>Palestine</td>
<td>10</td>
<td>19</td>
<td>21</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>167</td>
<td>197</td>
<td>349</td>
</tr>
</tbody>
</table>

Figure 6.2. Annual benefits from CVM survey (millions of USD)

Table 6.4. Annual benefits from CVM survey - use + option values only (millions of USD)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>16</td>
<td>31</td>
<td>37</td>
<td>63</td>
</tr>
<tr>
<td>Jordan</td>
<td>22</td>
<td>39</td>
<td>46</td>
<td>79</td>
</tr>
<tr>
<td>Palestine</td>
<td>5</td>
<td>9</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>79</td>
<td>93</td>
<td>165</td>
</tr>
</tbody>
</table>

6.1.3. Choice Modeling (CM) Results

Results from the choice modeling experiment are substantially different from those obtained using either the TCM or CVM. In terms of order of magnitude they are similar to those of the TCM; this, despite the fact that choice modeling is, like CVM, a stated preference model that should capture both use and non-use values. However, unlike either the case of TCM or CVM, results from the choice modeling indicate a distinct preference for water quality over water quantity for all countries. The benefits for an increase in quantity from 220 mcm/y of flow to 400 mcm/y keeping with quality level fixed was marginal, while the increase in benefits from increasing quality while keeping flow rates constant was substantial.
Table 6.5. Annual benefits from choice modeling survey (millions of USD)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>8.8</td>
<td>17.4</td>
<td>9.0</td>
<td>17.6</td>
</tr>
<tr>
<td>Jordan</td>
<td>6.0</td>
<td>8.9</td>
<td>6.7</td>
<td>9.6</td>
</tr>
<tr>
<td>Palestine</td>
<td>4.0</td>
<td>7.2</td>
<td>4.7</td>
<td>7.9</td>
</tr>
<tr>
<td>Total</td>
<td>18.8</td>
<td>33.5</td>
<td>20.4</td>
<td>35.1</td>
</tr>
</tbody>
</table>

Figure 6.3 Annual benefits from choice modeling survey (millions of USD)

6.1.4. Ancillary Benefits from Downstream Water Availability

The above benefit estimates, using each of the three valuation methods, capture only the value of in-stream uses of the water in the LJR. They do not capture benefits from having more water available downstream. These could include either use of the water at its lowest level prior to the junction with the Dead Sea, or the benefits from increased flow into the Dead Sea, which would slow the drop in the level of the Sea, a serious environmental problem in its own right. While these ancillary benefits from rehabilitation are likely substantial, no attempt to quantify them was made in this study. Thus, the benefits estimates given should be seen as lower bound estimates.

6.2. Costs of Implementation

The basis for the estimates of the costs of water supply are estimates provided by the consulting firm DHV, which calculated the infrastructure costs, as well as the opportunity costs of water (e.g., losses by current users) to achieve a flow level of 220mcm/y at a salinity level of 750 mg/l—the specifications of Scenario 2 in this study (Safier, 2011). The study found that it would be difficult to meet the 750 mg/l standard with only 220 mcm/y while also maintaining minimum monthly base flows needed for rehabilitation. It, therefore, based its calculations on supplying
238 mcm/y, the minimum amount of water needed for both 220 mcm/y and various monthly minimum flow specifications. The DHV report presented costs in net present value (NPV) terms using a 4% discount rate and a 30 year time frame. The estimate of the cost for achieving Scenario 2 was $868 million. This figure was based on numerous assumptions regarding necessary actions and the associated costs that will not be elaborated at length here. The primary assumption was that roughly 100-120 mcm/y would come from increased flows from the Sea of Galilee, which has salinity levels of roughly 250 mg/l. The remaining roughly 100 mcm/y would come from a variety of other actions. The primary costs, as estimated by DHV can be summarized as follows:

- $183 million in lost revenues for the farmers in the LJR basin
- $243 million in lost revenues for the farmers in the Upper Jordan River basin
- $325 million to substitute flow in Israel’s National Water Carrier with increased desalination of Mediterranean seawater
- $93 million for treating the Saline Water Carrier and its brine beyond what is currently planned, and transfer of the brines to the Dead Sea
- $25 million for further transfer of treated effluents from Haifa Bay to the Spring Valley Regional Council for use by farmers.

Associated input costs such as electricity, were assumed fixed, and associated environmental costs (externalities) were not taken into account. These costs notwithstanding, there are several reasons to believe that this cost estimate is upwardly biased. Firstly, the costs were based on infrastructure costs and lost revenues to Israeli farmers, assuming that all the necessary water would be provided by Israel. However, the opportunity cost of water in Israel, as measured either by replacement cost or the return on water used in agriculture (water productivity), is several times higher in Israel than in Jordan or Palestine (World Bank, 2012). Secondly, the estimates include lost revenue to farmers, rather than simply lost profits (producer surplus), as is common in benefit-cost analyses. This was done to reflect both the losses in terms of return on sunk costs for equipment as well as lost salaries to farmers in the region, assuming no alternative source of income. Such assumptions are highly restrictive and conservative, and likely elevate true costs. Thus, the cost estimates can be viewed as an upper-bound.

It is possible to meet both the 220 mcm/y and moderate water quality (e.g., 1000 mg/l salinity) criteria, i.e., Scenario 1, without additional water. In order to calculate the cost of Scenario 1, we took the average cost of supplying 238 mcm/y of water from the DHV estimate and deducted the cost of the additional 18 mcm/yr. This gives an annual cost of nearly $4 million less than Scenario 2. Providing the extra freshwater to the LJR from natural sources to meet a 400 mcm/y criteria would almost guarantee water of good quality (Scenario 4). Thus, the cost of Scenarios 3 and 4 are likely identical, though additional efforts to control for runoff and other point and nonpoint source pollutants to achieve good water quality may, increase the cost of Scenario 4 slightly. The cost of desalination was used as an upper bound cost estimate of supplying additional water, under the assumption that desalination represents the replacement cost of cutting withdrawals from the basin. This cost was estimated at $0.625 per cubic meter.\(^9\)

\(^9\)This figure is based on Becker et al (2010), adjusted for changes in electricity prices and exchange rates. This estimate does not include the costs of transfer of the water to the Jordan Basin. It is based on the assumption that naturally flowing water would be left in stream to flow into the Lower Jordan from the Sea of Galilee, and that the corresponding losses to national water networks would be compensated for by desalinated sea water.
Supplying an additional 162 mcm/y to Scenario 2 to meet the 400 mcm/y would cost roughly $101 million per year. Desalination is not currently directly utilized to supply Jordanian or Palestinian supplies, and much research has shown that a large quantity of water could be obtained at a lower marginal cost than desalination (e.g., FoEME, 2010). Thus, it should be viewed only as an upper bound estimate of the cost of “new” water. In reality, the costs are likely lower.

Given these assumptions, the estimates for the costs of the four scenarios chosen are summarized in Table 6.6 below:

<table>
<thead>
<tr>
<th>Quality</th>
<th>Quantity</th>
<th>Moderate</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>220 MCM/Y</td>
<td>Scenario 1</td>
<td>$46m</td>
<td>Scenario 2</td>
</tr>
<tr>
<td>400 MCM/Y</td>
<td>Scenario 3</td>
<td>$151m</td>
<td>Scenario 4</td>
</tr>
</tbody>
</table>

6.3. Comparing Costs and Benefits

6.3.1. Domestic Net Benefits

Given the estimates of benefits from the non-market valuation methods and the estimate of costs from the DHV study with the associated adjustments as detailed in the previous section, it is possible to conduct a basic benefit-cost analysis. Benefits and costs are presented in Tables 6.7-10 below, ordered by method, in decreasing order of total benefits.

When using the CVM total benefits, the highest of those measured, taking only domestic benefits into consideration, benefits outweigh costs for rehabilitation for all four scenarios, i.e., when pooling the benefits of all three populations. In the case of Jordan, the benefits to Jordanians alone are higher than the total estimated costs for the 220 mcm flow scenarios (Scenarios 1 and 2), although not for the higher flow scenarios (3 and 4) (Table 6.7). If non-use values are eliminated, total benefits outweigh costs only for Scenario 2, although the benefits for Scenario 1 are only slightly lower than the estimated costs (Table 6.8).

When taking benefits as measured using the choice modeling and contingent behavior travel cost methods, the benefits, even when pooled, are outweighed by the costs for all four scenarios (the higher end estimate for Scenario 4 is presented in the table – the lower end estimate is identical to that of Scenario 3).
Table 6.7. Annual benefits from CVM survey – Total Value (in millions of USD)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>33</td>
<td>64</td>
<td>78</td>
<td>134</td>
</tr>
<tr>
<td>Jordan</td>
<td>47</td>
<td>84</td>
<td>98</td>
<td>170</td>
</tr>
<tr>
<td>Palestine</td>
<td>10</td>
<td>19</td>
<td>21</td>
<td>46</td>
</tr>
<tr>
<td>Total Benefits</td>
<td><strong>90</strong></td>
<td><strong>167</strong></td>
<td><strong>197</strong></td>
<td><strong>349</strong></td>
</tr>
<tr>
<td>Annual Costs</td>
<td>46</td>
<td>50</td>
<td>151</td>
<td>151</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>44</td>
<td>117</td>
<td>46</td>
<td>198</td>
</tr>
</tbody>
</table>

Table 6.8. Annual benefits from CVM – use+option values only (millions of USD)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>16</td>
<td>31</td>
<td>37</td>
<td>63</td>
</tr>
<tr>
<td>Jordan</td>
<td>22</td>
<td>39</td>
<td>46</td>
<td>79</td>
</tr>
<tr>
<td>Palestine</td>
<td>5</td>
<td>9</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Total Benefits</td>
<td><strong>42</strong></td>
<td><strong>79</strong></td>
<td><strong>93</strong></td>
<td><strong>165</strong></td>
</tr>
<tr>
<td>Annual Costs</td>
<td>46</td>
<td>50</td>
<td>151</td>
<td>151</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>-4</td>
<td>29</td>
<td>-58</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 6.9. Annual benefits from choice modeling survey (millions of USD)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>8.8</td>
<td>17.4</td>
<td>9.0</td>
<td>17.6</td>
</tr>
<tr>
<td>Jordan</td>
<td>6.0</td>
<td>8.9</td>
<td>6.7</td>
<td>9.6</td>
</tr>
<tr>
<td>Palestine</td>
<td>4.0</td>
<td>7.2</td>
<td>4.7</td>
<td>7.9</td>
</tr>
<tr>
<td>Total Benefits</td>
<td><strong>18.8</strong></td>
<td><strong>33.5</strong></td>
<td><strong>20.4</strong></td>
<td><strong>35.1</strong></td>
</tr>
<tr>
<td>Annual Costs</td>
<td>46</td>
<td>50</td>
<td>151</td>
<td>151</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>-27.2</td>
<td>-16.5</td>
<td>-130.6</td>
<td>-115.9</td>
</tr>
</tbody>
</table>

Table 6.10. Annual benefits from TCM survey (millions of USD)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>0.96</td>
<td>7.08</td>
<td>10.85</td>
<td>49.48</td>
</tr>
<tr>
<td>Jordan</td>
<td>3.59</td>
<td>8.51</td>
<td>11.73</td>
<td>44.03</td>
</tr>
<tr>
<td>Palestine</td>
<td>1.38</td>
<td>5.88</td>
<td>8.63</td>
<td>17.21</td>
</tr>
<tr>
<td>Total Benefits</td>
<td><strong>5.93</strong></td>
<td><strong>21.47</strong></td>
<td><strong>31.21</strong></td>
<td><strong>110.72</strong></td>
</tr>
<tr>
<td>Annual Costs</td>
<td>46</td>
<td>50</td>
<td>151</td>
<td>151</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>-40.07</td>
<td>-28.53</td>
<td>-119.79</td>
<td>-40.28</td>
</tr>
</tbody>
</table>
6.3.2. Incorporating International Tourists

It is important to note that the above benefit estimates included only those from domestic tourists. International tourists were not included in the above analysis as the benefits measured are those accrued by the visitors themselves, and not the state. However, it is important to note that well over 1 million international tourists visit the Jordan River each year. This number can be expected to increase with the rehabilitation of the Lower Jordan. From the surveys collected from international tourists, it is clear that they also place a strong value on the quality of the Lower Jordan and that this would affect the quality of their visits. Table 6.11 below presents the calculated increase in consumer surplus per visit for international tourists in each of the scenarios as calculated form surveys collected. The values are substantial for all scenarios. For those surveyed in Israel and Palestine, the values are much higher even than those of domestic visitors (compare to Table 6.1).

Regarding water quality, in both the low flow (220 mcm/y) and high flow (400 mcm/y) scenarios net benefits were higher for the higher water quality scenarios (2 and 4). This is because the difference in costs between the low and high quality water scenarios, with a given flow level, were small or non-existent, while the benefits differ substantially. Thus, should rehabilitation be pursued, it should be done so at higher water quality levels, regardless of the amount of water dedicated for flows.

It is not possible from the surveys issued to estimate the expected increase in international tourism as a result of river rehabilitation. For many international tourists the region is a repeat destination in which the LJR could play an important role, while for others, such a visit is a once in a lifetime experience and thus, visitation rates for them would not be expected to increase. Moreover, should the LJR become a more significant element of the international tourists’ itinerary, it is unclear the extent to which the stay at the LJR would add to the overall time spent in the region, and the extent to which stay at the LJR would come at the expense of stay in other local tourist sites.

What is possible given the existing data is calculation of the number of international tourists that would need to visit in order for benefits to exceed the costs of rehabilitation. This can be calculated by dividing the net cost (cost minus total domestic benefits) by the average consumer surplus per visit by international tourists as presented in Table 6.11. The results of such calculations, using total benefits from the TCM and the CVM (use values only) methods are presented in Table 6.12. As can be seen, the values range from between 1 to 9.6 million additional tourist days, depending on the scenario and method in question.

It is important to note, that this analysis does not take into consideration potential benefits for the host countries in terms of money spent by international tourists in the region. Profits from such sales could be considered additional benefits for local governments.
Table 6.11. Additional consumer surplus per visit – International tourists (in USD)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>6.06</td>
<td>14.39</td>
<td>14.31</td>
<td>17.21</td>
</tr>
<tr>
<td>Jordan</td>
<td>3.35</td>
<td>3.94</td>
<td>4.45</td>
<td>6.32</td>
</tr>
<tr>
<td>Palestine</td>
<td>12.45</td>
<td>19.11</td>
<td>19.11</td>
<td>23.34</td>
</tr>
<tr>
<td>Average</td>
<td>7.29</td>
<td>12.48</td>
<td>12.62</td>
<td>15.62</td>
</tr>
</tbody>
</table>

Table 6.12. Additional international tourist visits necessary for positive net benefits (million days on all three entities)

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCM</td>
<td>4.7</td>
<td>2.3</td>
<td>9.6</td>
<td>2.6 – 3.3</td>
</tr>
<tr>
<td>CVM (use+option values only)</td>
<td>nb*&gt;0</td>
<td>nb&gt;0</td>
<td>8.6</td>
<td>nb&gt;0</td>
</tr>
</tbody>
</table>

* nb>0 indicates the net benefits were positive when evaluating only domestic tourism, and thus no additional international tourists would be necessary to justify the given scenario on economic grounds.

7. DISCUSSION

The results presented in the previous section vary considerably by valuation method. However, it is clear that the benefits from rehabilitation of the Lower Jordan River are substantial. In all cases, the estimated costs are within the range of estimated domestic benefits (Table 7.1). A comparison of average benefits (the average of the three methods) to the estimated costs shows that the benefits are roughly equal to the costs for Scenarios 1 and 4 and greatly exceed the costs for Scenario 2, while falling short of the costs for Scenario 3 (Table 7.1). Adding the economic benefits associated with international tourists to those of the domestic populations would certainly tip the balance strongly in favor of at least 3 of the 4 scenarios.

Several issues are worth noting in terms of interpretation of the results. Firstly, the only method according to which net benefits for all scenarios were positive was the CVM. In this method non-use values accounted for a large share of the benefits and were essential in terms of the scenarios passing a benefit-cost type analysis. Furthermore, when looking at total benefits, the benefits to Jordan alone outweigh the costs. If, however, one takes only the use-value benefits, then only when benefits are pooled do they surpass the estimated costs. That means that regional cooperation, or at least coordination, would be necessary for an economically beneficial rehabilitation project. Such a situation is not surprising given the public good nature of the shared resources involved.

With two of the three methods (TCM and CVM) there was a strong preference for quantity of water over quality; i.e., relative to Scenario 1, an increase in water quantity was valued more
than an increase in water quality. This was not the case with the choice modeling method. Given inconsistency of the choice modeling results with those of the other two, together with questions raised by some of those surveyed, these results are likely the least reliable of the employed three methods. However, given supply of a certain quantity of water, be it 220 mcm/y or 400 mcm/y, the additional costs to improve to good quality are economically justified. That is, the additional benefits from improvement of water quality outweigh the additional costs (indeed, in the case of annual flow of 400 mcm, there may, in fact, be little additional costs). Thus, should a policy of rehabilitation be pursued, regardless of the flow level chosen, attaining good water quality standards is economically efficient.

It is also important when interpreting the results to remember the self-imposed constraints, limitations and biases built in to the valuation and cost estimations. In terms of the benefits, only in-stream values of the LJR were estimated. Ancillary benefits from the additional water provided downstream, whether it be re-used off-stream or whether it flow into the Dead Sea, are likely substantial, but are not included in the assessment. Thus, true benefits are likely higher. In contrast, cost estimates take the cost of desalination as the marginal cost of water, despite the fact that lower cost options are almost certainly available and include lost revenues of farmers, rather than lost producer surplus. Thus, the true costs are likely lower. Given these built in biases, the above estimates are conservatively biased against rehabilitation. Therefore, cases in which benefits outweigh costs can be seen as robust.

<table>
<thead>
<tr>
<th>Scenario 1 (220mcm/moderate quality):</th>
<th>Benefits Range</th>
<th>Benefits Average</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6-90</td>
<td>38</td>
<td>46</td>
</tr>
<tr>
<td>Scenario 2 (220mcm/good quality):</td>
<td>21-167</td>
<td>74</td>
<td>50</td>
</tr>
<tr>
<td>Scenario 3 (400mcm/moderate quality):</td>
<td>20-197</td>
<td>83</td>
<td>151</td>
</tr>
<tr>
<td>Scenario 4 (400mcm/good quality):</td>
<td>35-349</td>
<td>165</td>
<td>151</td>
</tr>
</tbody>
</table>
8. BUSINESS CASE STUDIES

As many of the estimated economic benefits of focus in this study stem from the tourism sector, the consultancies evaluated the economic prospects of several specific tourism sites and initiatives given the prospect of a rehabilitated Lower Jordan River. This section presents summaries of detailed tourism business case studies evaluated for their economic potential assuming a rehabilitated river and freedom of access to all populations to the river banks.

8.1. Israeli Case Studies

The Peace Island

Location and Current Status
The Peace Island is located where the Jordan and Yarmouk rivers converge and extends over an area of 150 dunams (15 hectares). The site includes overlooks of several scenic areas as well as a retired dam and electricity works that are reminders of early development in the modern area. At present, the Island is under Jordanian sovereignty, but it is possible for Israelis and tourists coming from Israel to visit the site. Currently an estimated 50,000 visitors per year visit the site.

Vision
A preliminary conceptual plan is to develop the entrance area of the site which is under Israeli sovereignty and thereby create a place with its own identity and character, which can be branded as such. The proposed business plan encompasses 3 stages. All stages include some development and an investment in commercial enterprises by an external entrepreneur. Among the ventures are a buffet and retail souvenir tent in the 1st stage, flowing water in a canal and constructed wetlands and built observatory routes in the 2nd stage, and building a new coffee house in the 3rd stage. Also, many aesthetic improvements are planned to take place throughout the process.

Financial Projections
Investment in the 1st stage is estimated at 600,000 NIS. The fixed cost of operating the facility is projected to be 1.34 million NIS, with an assumed margin of gross profit at 80%, giving break-even point of 1.7 million NIS in turnover. Sensitivity analyses conducted suggested that reaching the above break-even point is feasible. The associated expenses of the 2nd stage have not yet been received from the project planning body, and therefore, overall costs were not estimated. The initial investment in the 3rd stage was estimated at some 2 million NIS and the operational fixed costs at around 2.5 million NIS. Assuming a 60% gross profit margin, the annual revenues needed to achieve operational balance is 4.2 million NIS. An initial assessment concluded that this project is feasible, but further analysis should be performed.

Enabling Conditions
The Peace Island Park is already accessible from Israel for up to 50,000 visitors annually. Additional capacity would be necessary. In addition, permission to alter the existing water flows bordering the site in order to channel water to canals and wetlands would be required.
Israeli Case Studies

Rob Roy Canoeing

Location and Current Status
Rob Roy is an Indian Canoeing site in the Northern stretch of the Lower Jordan River that provides a variety of attractions and experiences – canoeing, art workshops, rafts construction, and an open stage, among others. Current annual revenues are some 1 million NIS, and the net profit (before taxes) varies, at between 10-25 percent of revenues.

Vision
As a business primarily based around river-based activities, Rob Roy’s economic potential is positively related to the strength of flow of the river. Increased flows in the Lower Jordan are likely to bring about a more enjoyable canoeing experience and therefore draw in more tourists. Two different levels of potential flow were analyzed. In the 1st scenario, the flow will be slightly stronger, but it will still enable a round trip canoeing outing. In the 2nd scenario, the flow will be much stronger, in which case outings will necessarily be only one way.

Financial Prospects

Income increase: According to the non-market benefit study, the visit frequency in the LJR is expected to increase by 20%-45% in Scenario 1, and by 60%-150% in Scenario 2. It is assumed that the increase in annual flow level will cause an increase in the visitation rate, which in turn will cause a proportional increase in annual revenues.

Investment: The primary investment needed to adjust to higher flows includes canoes purchased for the relevant scenarios. In addition, some investment would need to be dedicated to expanding in the site itself to accommodate more visitors. In the case of Scenario 2, since it will be only a one way trip, there is a need to buy two vehicles to convey the visitors and canoes. The estimation of total investment needed vary from 53,000 to 117,000 NIS for Scenario 1, and between 423,000 to 606,000 NIS for Scenario 2, amortized over a period of 10 years.

Change in annual expenditures: Labor expenses, cost of goods sold, and depreciation are the three main expenses that will change. Labor expenses and cost of goods sold are expected to increase proportionally to the increase in income. Other expenses do not change significantly. Since not all expenses will increase, the net profit will increase.

Change in net profit margin: Considering the changes in the expenditure mentioned above, the net increase in profits is predicted some 70-170 percent in Scenario 1, and 200-500 percent in Scenario 2.

Enabling Conditions
Other than increased river flows and financial investment, no additional enabling conditions are seen as necessary.
8.2. Jordanian Case Studies

Karameh Dam – Wetland Development Project

Location and Current Status
The Karameh Dam, the second largest dam in Jordan, is located on Wadi Mallaha, adjacent to the Jordan River near the town of Karameh. The construction of the dam was completed in September 1997, and was intended to serve as a reservoir to store surplus winter flows from the King Abdullah Canal for irrigation at the southern end of the valley. However, due to incorrect estimations in the planning of the dam, the water in the reservoir became brackish and unfit for drinking and agricultural purposes. Outside of a desalination plant built in 2010, the site is largely undeveloped and does not attract tourists.

Vision
Migratory birds flying from Europe to Africa in autumn visit suitable habitats in Jordan to make final preparations for the long journey across the Sahara desert. With appropriate land and wetland management of Karameh, the open water pools and surrounding banks will attract a wide variety of birds throughout the migration seasons and in winter.

FoEME proposes development of eco-tourism and nature conservation activities along the Karameh retention lake. Visitors will pay a small fee to access the whole area of the park, and will enjoy water recreation activities such as swimming and boating as well as picnicking in the green areas. Usage of boating and bird watching facilities will be charged additionally. Recreational fishing opportunities will be provided for visitors, and a fish restaurant will be accessible to all, serving fish grown in the dam itself as a specialty. The site will attract birdwatchers, picnickers, hikers, and both Jordanians and tourists eating at the restaurant.

Financial Projections
Park capacity will be 60 guests per day, and restaurant capacity will be 30 guests per day. The minimum number of bird watching visitors is estimated to be 1,500 per year. Financial projections estimate that the project could be profitable from its second year of operation, with profits reaching 9,868 JD that year and 31,859 JD in the third year. Neighboring communities will benefit from the park as a recreational and educational site, and as a source of employment.

Enabling Conditions
The proposed park will require additional infrastructure and ecosystems management. Recreation facilities will include the installation of picnic tables and lounge tables along the water’s edges as well as development of safe swimming areas. Bird watching facilities must be constructed, boats acquired, and an equipment rental center constructed. A sustainable fishery/fish farm must be established, and fish restaurant opened. Nature conservation is an important element of the work of the park. Conservation activities will need to include protection and restoration of nature and Important Bird Areas (IBAs), development of land management plans, and production of educational materials to provide ecological information to visitors. In line with Goal 3 of Jordan’s Water Strategy 2008-2022 (Water for Life, Jordan’s Water Strategy 2008-2022; 2009), the park management will ensure that Environmental Impact Assessments (EIAs) are conducted during the construction stage of the project.
Jordanian Case Studies

Sweimeh Business Case Study

Location and Current Status
Sweimeh is located at the southern end of the Jordan River, where the river terminates in the Dead Sea. The landscape varies with desert landscapes, rocky cliffs, and mountainous wadis, offering spectacular scenery. In December 1994, the Jordan Valley Authority adopted the Dead Sea Tourism Project Master Plan. The plan identifies three major development sectors in the eastern Dead Sea region, including Sweimeh. The plan provides for the development of 12,000 bed units for Sweimeh in motels and hotels of various standards, as well as roads, water and wastewater systems, power and telecommunications services, recreation and park areas, campsites, restaurants, sport activities, and a health center.

Vision
The area of Sweimeh can take advantage of proximity both to a rehabilitated Jordan River and the Dead Sea in order to be a major hub of both local and international tourism. In order to maximize this benefit, FoEME proposes to develop eco-tourism and nature conservation activities along the river through the establishment of a park. Visitors will pay a small fee to enter the park and to access recreation along the water, including hiking and swimming. Boating facilities and bicycle rentals will involve additional charges.

Financial Projections
Park capacity is set to 60 visitors per day, with 40% occupation expected in weekends and 20% occupation expected in weekdays during the six high-season months.

Two different restoration scenarios of various combinations of possible activities in the park were evaluated in terms of potential revenue and financial feasibility, corresponding to Scenario I and II in the valuation study – that is, 220 mcm of water at two different salinity levels. Financial projections indicate that under Scenario I, the project will not reach the break-even point within a reasonable period (10 years). However, it is foreseen that Scenario II will reach the break-even point in the third year and will be profitable in the following years (at a profit rate of 9,450 JD for 40% park capacity). Members of the community will benefit from the park not only in gaining a local facility for recreation and learning, but as a source of paid employment or paid services.

Enabling Conditions
Strategic planning for tourism development on the western shore of the Dead Sea emphasizes the need to retain the biblical character of the Dead Sea environment. Integration between resort, desert, and cultural tourism is stressed as a central goal of tourism development. Other landmarks in the region will be made more accessible and attractive to tourist groups. Protection of the ecological and hydrological systems is critical for the regional prosperity of both man and nature. Sustainable management of the area’s natural resources is the only approach towards long-term development of the Sweimeh project and the Dead Sea Master Plan. Sustainable land management, no-development zones and hydrological buffer zones close to the wadis and rivers will be important pre-conditions to achieve these goals.
8.3. Palestinian Case Studies

Fasayil

Location and Current Situation
Fasayil is located 14 kilometers north of the Jericho Governorate, and about 40 kilometers southeast of Nablus with total land area of nearly 48,000 dunams. The area is rich with antiquities, containing the tomb of an ancient anchorite and the ruins of a monastery dedicated to Saint Cyriacus, a monk who died in 556 CE. In addition, nearby Fasayil, in Tell Sheikh, there is an ancient pool, most of its walls of which are still visible. In recent years, the Israeli military has demolished several newly built structures in the area.

Vision
Proposed development of the park into a multi-faceted recreational facility containing a range of family-oriented attractions was analyzed. The site’s ancient ruins will serve as a backdrop for several modern recreation opportunities. These activities include bumper boats, go-carts, horseback and camelback riding, bird watching, camping grounds, and serving as a hub for tours in Jericho and, especially, along the Lower Jordan River, along which kayaking facilities will be developed. As such, access to a rehabilitated Lower Jordan River would substantially contribute to the attractiveness of such a location. The region’s moderate winter weather means it will serve as an attractive location during that season. Some indoor facilities are envisioned for avoiding summer heat and for the relatively infrequent rain events. The site has ample territory available for development and faces no competition from similar existing facilities. It is envisioned that the site would be an attraction for Palestinian, Israeli, and international tourists.

Financial Projections
Initial investment costs necessary for development of the site are estimated at roughly $1.5 million. This estimate covers only the costs of development of facilities and initial marketing costs, and does not include the cost of land acquisition, as this depends on the extent to which owners of land titles are incorporated into the business model. Furthermore, it does not include the cost of infrastructure, such as improvement to roads that would facilitate access to the site. The site is envisioned as benefiting from both private and public development funding.

Enabling Conditions
Currently, access to the site is limited due to restrictions on movement imposed by the Israeli military on Palestinian citizens. In order for the project to succeed, guarantees of freedom of movement to the site and to the Lower Jordan River must be secured. In addition, because of political uncertainty, any investment must be politically and financially guaranteed (e.g., loan guarantees) by the international community in order to mitigate concerns and reduce risks faced by potential investors. International investment, perhaps from donor countries, would inspire confidence in other investors and signal reduced political risks. Building permits would also be necessary from the Israeli military. Finally, support and investment by the Palestinian Authority will be critical for the project’s eventual success.
8.3. Palestinian Case Studies

Family Attractions near the Baptism Site

Location and Current Status
The Baptism site along the Western bank of the Lower Jordan River is cited as being potentially among the primary tourist attractions in the region, based on its importance as a prominent Christian site in the Holy Land. The site is currently frequented by more than 100,000 tourists a year and is currently undergoing a multi-million dollar renovation, but is still considered to be attracting much less than its potential capacity. Because of its sensitive location, the Baptism site has not been regularly open to the public since the Israeli occupation of the West Bank in 1967. The site and access to it are under control of the Israeli military. Currently, the site’s activities are limited to a presentation by a tour guide and bathing in the river. As site entrance is free, income generated is limited to revenues from a souvenir shop and refreshments. Tourism is almost exclusively composed of international tourists, as restrictions placed on Palestinians make access difficult. Furthermore, there is little domestic marketing to the Palestinian population.

Vision
Based on the lack of tourism and vacation locations for the Palestinian population, a plan was evaluated that would develop a broad range of tourism facilities in proximity to, but not at the Baptism site. This is in order to preserve the religious character of the site, while at the same time attracting large numbers of international and domestic visitors, who would then spend more time in the region. The proposed park would have many of the same attractions as the proposed site at Fasayil, including horseback and camelback riding, bird watching, camping grounds, and serving as a hub for tours in Jericho and, especially, along the Lower Jordan River. Proximity to the Baptism site would potentially increase the potential for tourists to visit both sites.

Financial Projections
Initial investment costs necessary for development of the site are estimated at roughly $1.5 million, similar to that of the proposed site at Fasayil. This estimate covers only the costs of development of facilities and initial marketing costs, and does not include the cost of land acquisition nor the cost of infrastructure, such as improvement to roads that would facilitate access to the site. The site is envisioned as benefiting from both private and public development funding. The financial feasibility of the site is dependent both on freedom of access by both local and international tourists, as well as the extent to which access to the Baptism site is improved, and the extent to which the Baptism site itself manages to attract additional tourists and/or those currently visiting competing Baptism sites in Israel and Jordan.

Enabling Conditions
Enabling conditions are similar to those for the proposed site at Fasayil, including lifting of restrictions on freedom of movement, international investment and financial and political guarantees, and support from the Palestinian Authority. In addition, suitable land in proximity to the Baptism site would need to be secured. As the facilities envisioned in this project are similar to those for the proposed Fasayil project, coordination would be necessary in order to avoid duplication of effort and splitting the market. Efforts should be made to either concentrate development on one location or divide the attractions between the two proposed sites.
9. CONCLUSIONS

This study is a first attempt to analyze rehabilitation of the LJR from an economic perspective. The gaps in knowledge are considerable. As such, a study such as this serves to frame the debate and provide initial figures from which to evaluate various policy options. It is intended as an initial jumping off point from which to discuss and debate policy regarding the potential benefits of rehabilitation of the LJR. Ideally, further research will be sponsored to investigate the causes for the differences between the methods and to better understand the potential contribution of international visitors to the region, by, for instance, collecting data on spending habits and employing regional multipliers.

Of concern to policymakers, but not addressed within this study, are issues of how costs and benefits are distributed, especially within each country. While the business cases demonstrate the potential for the area to attract investment, it is clear that some current users of water will be negatively affected by reallocation necessary for river rehabilitation. Economic analyses done at sub-national levels that investigate more localized impacts would be a welcome extension or follow-up to the current study. So too would an analysis that investigates various options for cost-sharing, a topic that is of critical importance to transboundary cooperation on natural resource management.

These limitations notwithstanding, this research demonstrates that the economic benefits of a rehabilitated LJR are substantial, even when benefits to international visitors are excluded from the analysis. While the costs of such an endeavor are also large, this initial analysis shows that collectively, the benefits to the countries likely outweigh these costs, which would justify rehabilitation purely on economic grounds. As is common with many shared public goods, the net benefits are maximized when the partners cooperate. Such regional cooperation may well bring about a future in which the LJR once again hosts a healthy ecosystem which provides economic, as well as ecological, social and cultural benefits.
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