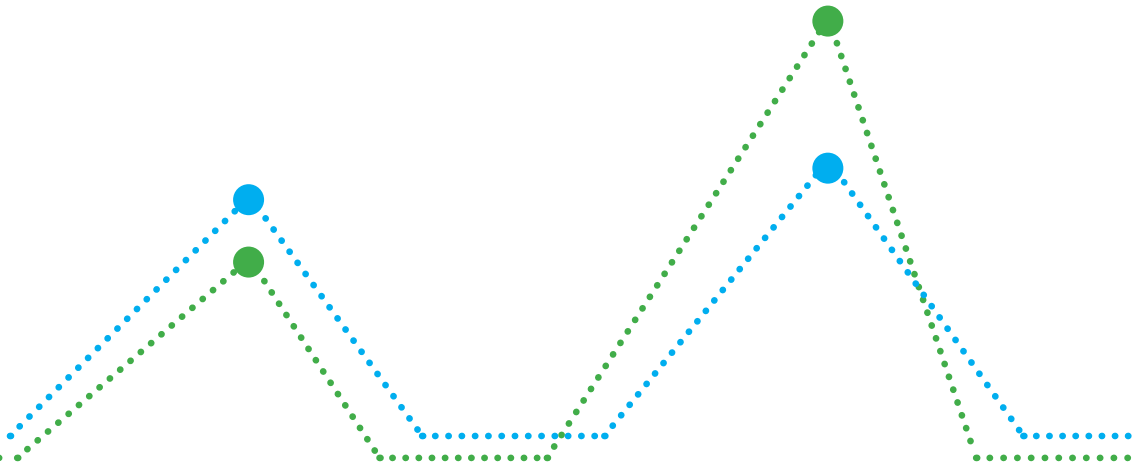




# TOWARDS A LIVING JORDAN RIVER:

## A Regional Economic Benefits Study on the Rehabilitation of the Lower Jordan River



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## **Friends of the Earth Middle East**

**EcoPeace**

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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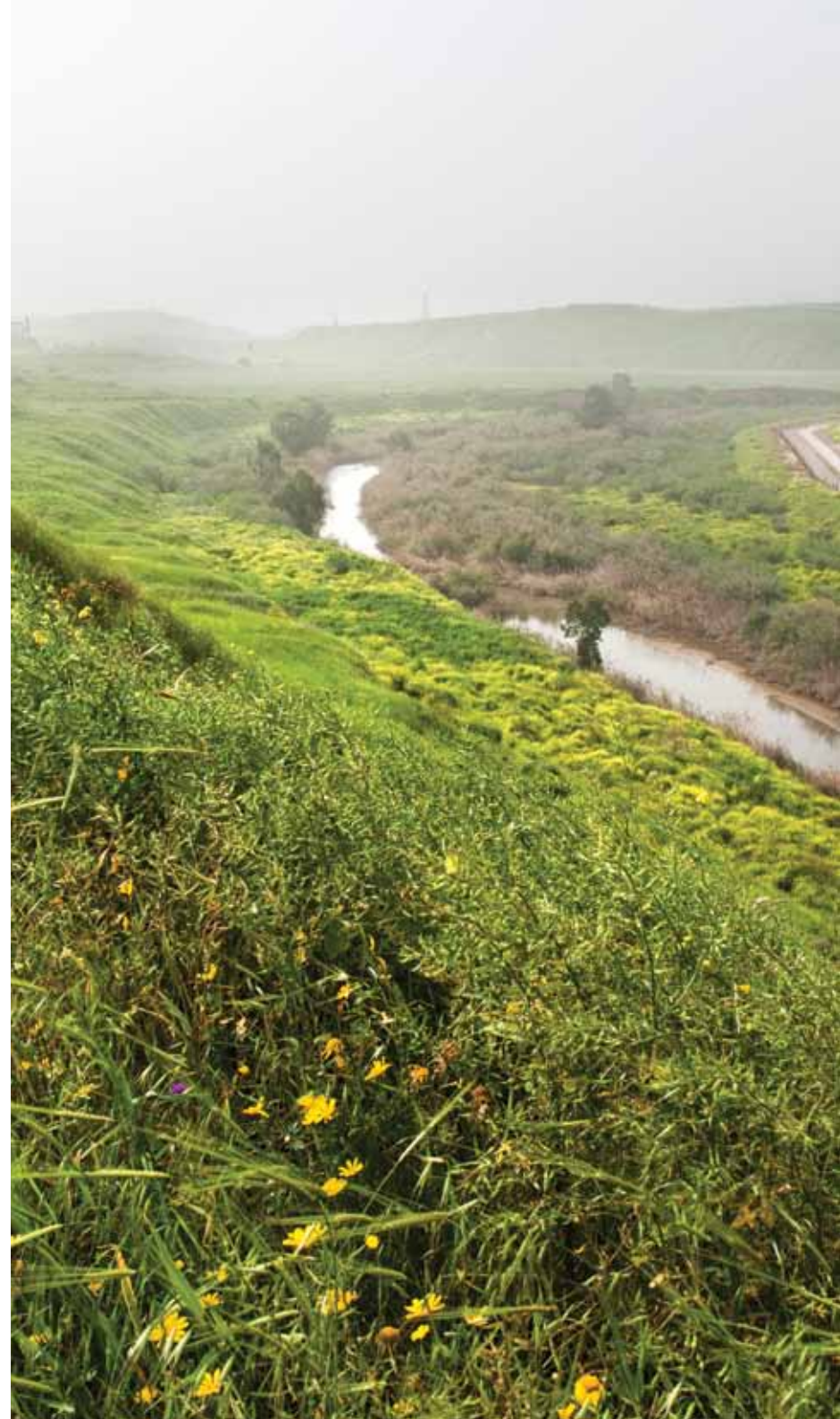
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# INTRODUCTION

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:

1. **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.
2. **Contingent Valuation Method (CVM)** - which calculates benefits based on responses to a WTP survey for each of the various rehabilitation scenarios.
3. **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 1.** Survey Sample Distribution

	Israeli	Jordanian	Palestinian	Total
Locals	394	178	276	848
Tourists	91	101	98	290
Total	485	279	374	1138

## 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 2.** Annual benefits from CVM survey - Total Value (millions of USD)

	S 1	S 2	S 3	S 4
Israel	33	64	78	134
Jordan	47	84	98	170
Palestine	10	19	21	46
<b>Total Benefits</b>	<b>90</b>	<b>167</b>	<b>197</b>	<b>349</b>
<b>Annual Costs</b>	<b>46</b>	<b>50</b>	<b>151</b>	<b>151</b>
<b>Net Benefits</b>	<b>44</b>	<b>117</b>	<b>46</b>	<b>198</b>

**Table 3.** Annual benefits from CVM - use + option values only (millions of USD)

	S 1	S 2	S 3	S 4
Israel	16	31	37	63
Jordan	22	39	46	79
Palestine	5	9	10	22
<b>Total Benefits</b>	<b>42</b>	<b>79</b>	<b>93</b>	<b>165</b>
<b>Annual Costs</b>	<b>46</b>	<b>50</b>	<b>151</b>	<b>151</b>
<b>Net Benefits</b>	<b>-4</b>	<b>29</b>	<b>-58</b>	<b>14</b>

**Table 4.** Annual benefits from choice modeling survey (millions of USD)

	S 1	S 2	S 3	S 4
Israel	8.8	17.4	9.0	17.6
Jordan	6.0	8.9	6.7	9.6
Palestine	4.0	7.2	4.7	7.9
<b>Total Benefits</b>	<b>18.8</b>	<b>33.5</b>	<b>20.4</b>	<b>35.1</b>
<b>Annual Costs</b>	<b>46</b>	<b>50</b>	<b>151</b>	<b>151</b>
<b>Net Benefits</b>	<b>-27.2</b>	<b>-16.5</b>	<b>-130.6</b>	<b>-115.9</b>

**Table 5.** Annual benefits from TCM survey (millions of USD)

	S 1	S 2	S 3	S 4
Israel	0.96	7.08	10.85	49.48
Jordan	3.59	8.51	11.73	44.03
Palestine	1.38	5.88	8.63	17.21
<b>Total Benefits</b>	<b>5.93</b>	<b>21.47</b>	<b>31.21</b>	<b>110.72</b>
<b>Annual Costs</b>	<b>46</b>	<b>50</b>	<b>151</b>	<b>151</b>
<b>Net Benefits</b>	<b>-40.07</b>	<b>-28.53</b>	<b>-119.79</b>	<b>-40.28</b>



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

	S 1	S 2	S 3	S 4
TCM	4.7	2.3	9.6	2.6 - 3.3
CVM (use + option values only)	nb*>0	nb>0	8.6	nb>0

\* 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 E57). 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 E57). 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 7.** Domestic Benefits Range

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



## 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.

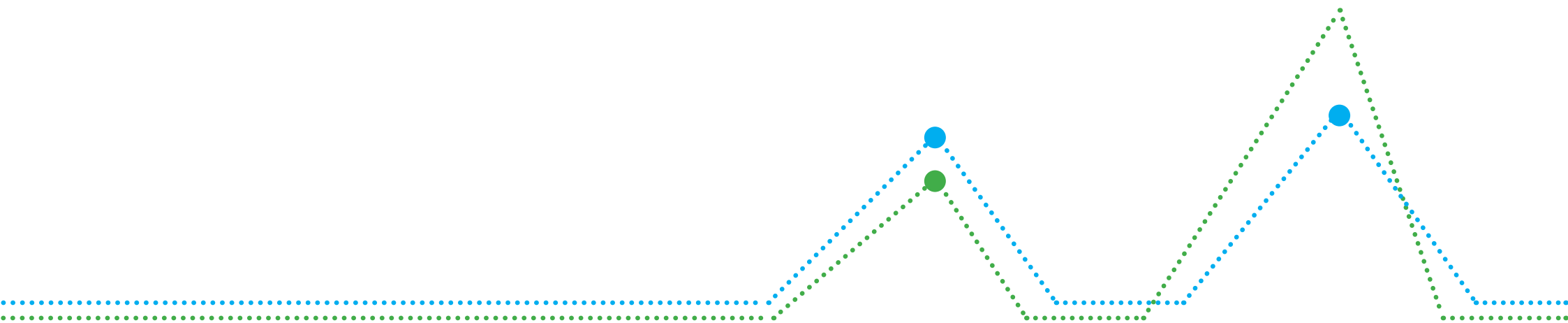
## CONCLUSIONS

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.









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