

MYWAS (Multi-Year Water Allocation System)
The Value of Water: Optimizing Models for Sustainable Management, Infrastructure Planning, and Conflict Resolution

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1. Introduction

The Water Economics Project (WEP)

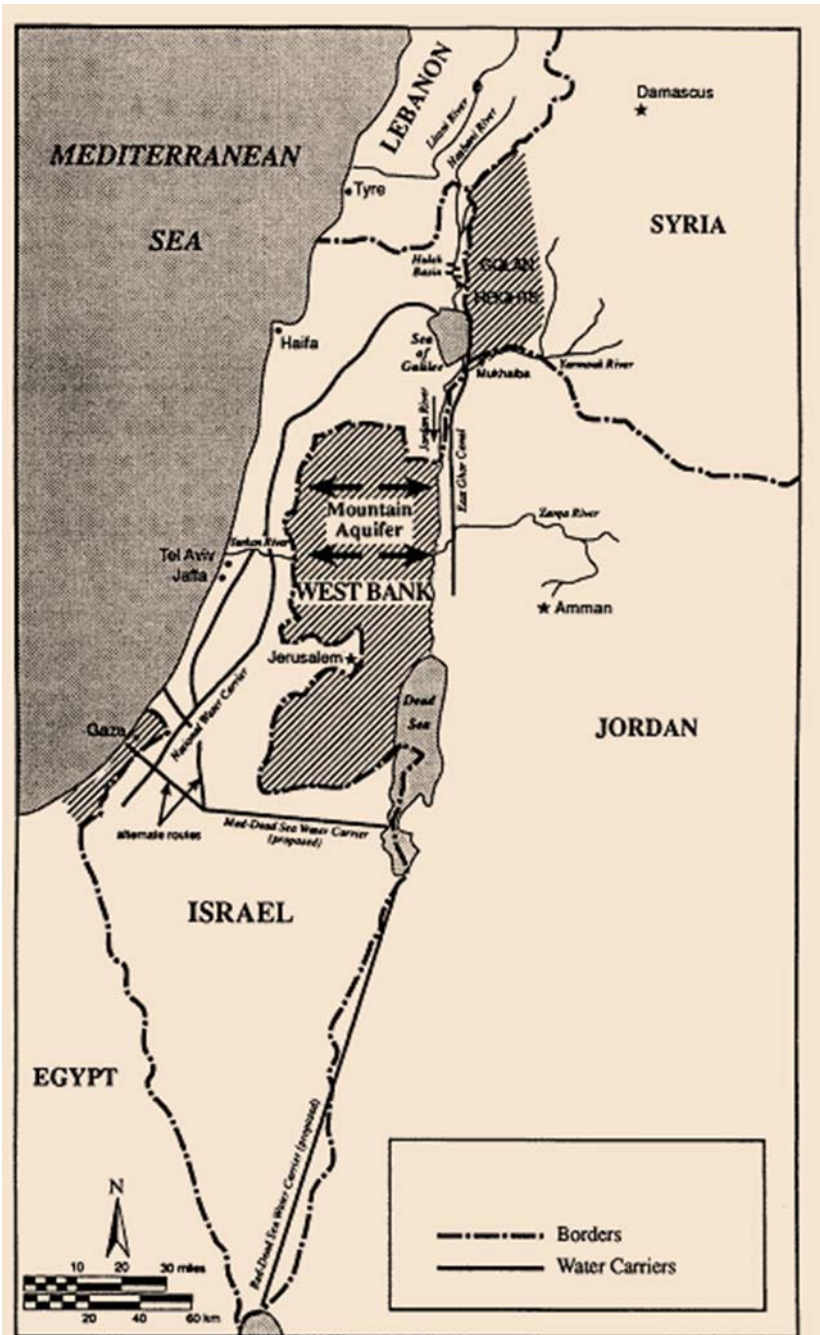
2. Water Ownership and The Value of Water

Fishelson's Example

Fishelson's Example

“Water is a scarce resource. Scarce resources have value. And the value of the water in dispute is bounded above by the replacement cost given by desalination, with that upper bound not very high.”

Gidon (Jedda) Fishelson



Fishelson's Example Elaborated

- The cost of desalination on the Mediterranean coast is about \$0.60/cm
- Water in the Mountain Aquifer would cost roughly \$0.40 to pump it up and bring it to the coastal cities
- Hence such water (*in situ*) is not worth more than \$0.20/cm ($\$0.60/\text{cm} - \$0.40/\text{cm}$)
- 100 Million cubic meters of such water is not worth more than \$20 million.

Fishelson's Example Elaborated

Every country with a seacoast can have as much water as it wants if it chooses to spend the money to do so. Hence, so far as water is concerned, every country with a seacoast can be self-sufficient in its food supply if it is willing to incur the costs of acquiring the necessary water.

Disputes over water among such countries are merely disputes over costs, not over life and death.

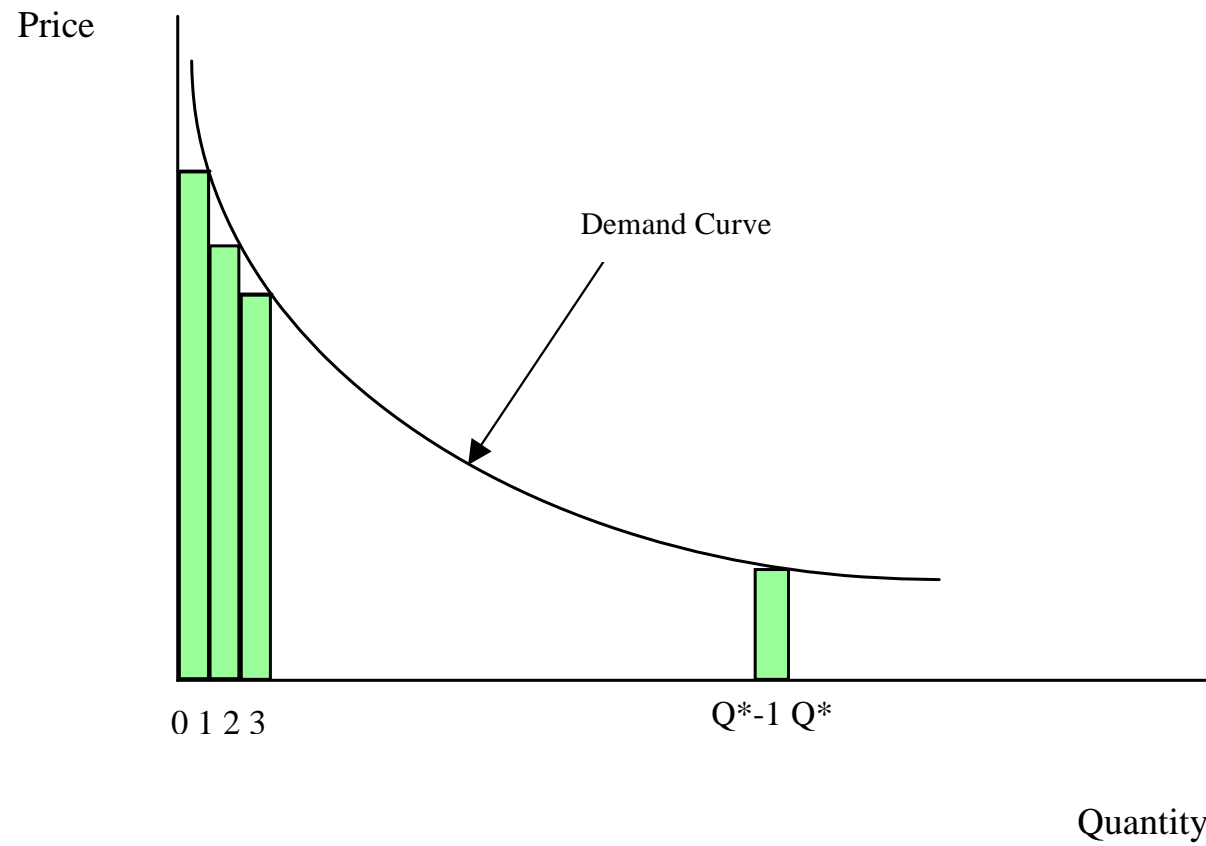
Water is not worth War!

3. Why Actual Water Markets Will Not Work

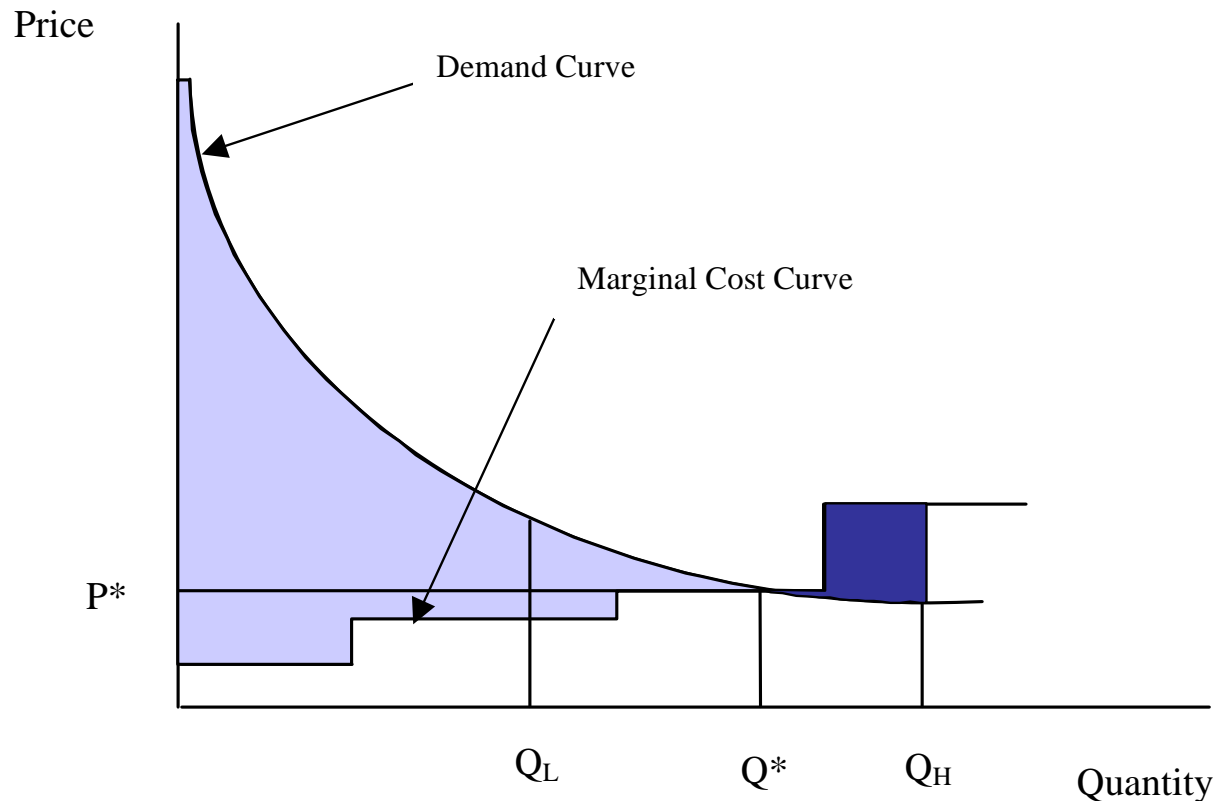
4. Optimal Sustainable Management

WAS and MYWAS

Gross Benefits from Water



Net Benefits from Water



WAS and MYWAS

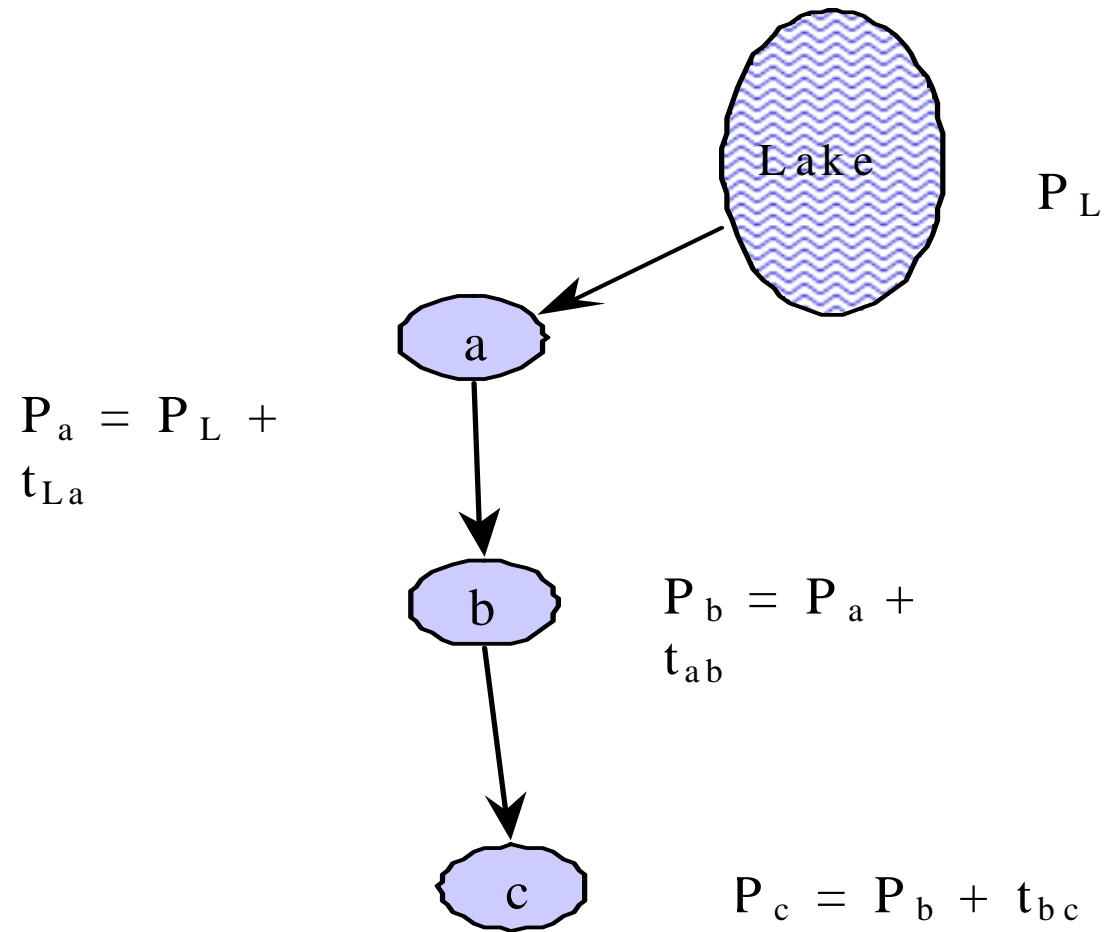
- **The Timing, Order, and Capacity of Infrastructure Projects**
- **Storage Management**
- **Aquifer (and Other Natural Storage) Management**

WAS and MYWAS

- **Fossil Aquifers**
- **Climatic Uncertainty**
- **Global Warming**

5. Shadow Values and Scarcity Rents

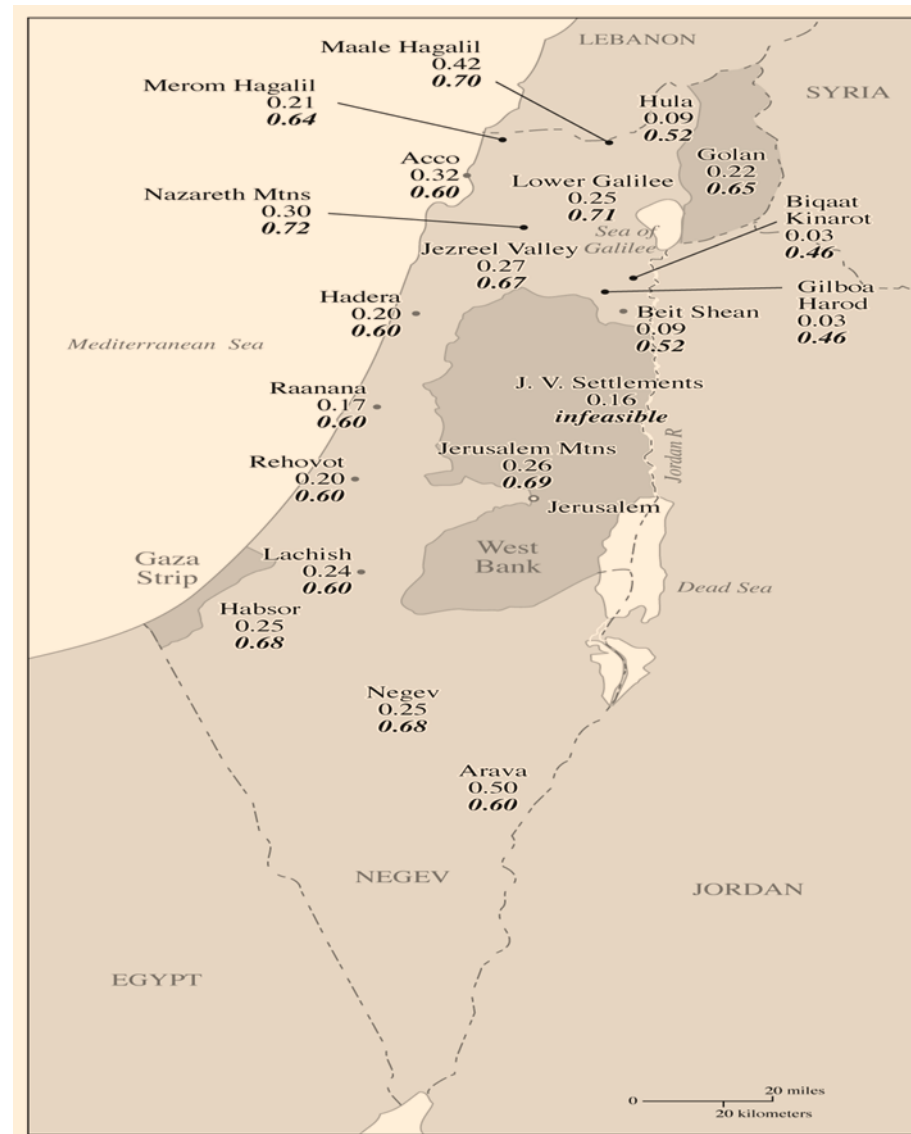
Efficient Water Allocation and Shadow Values



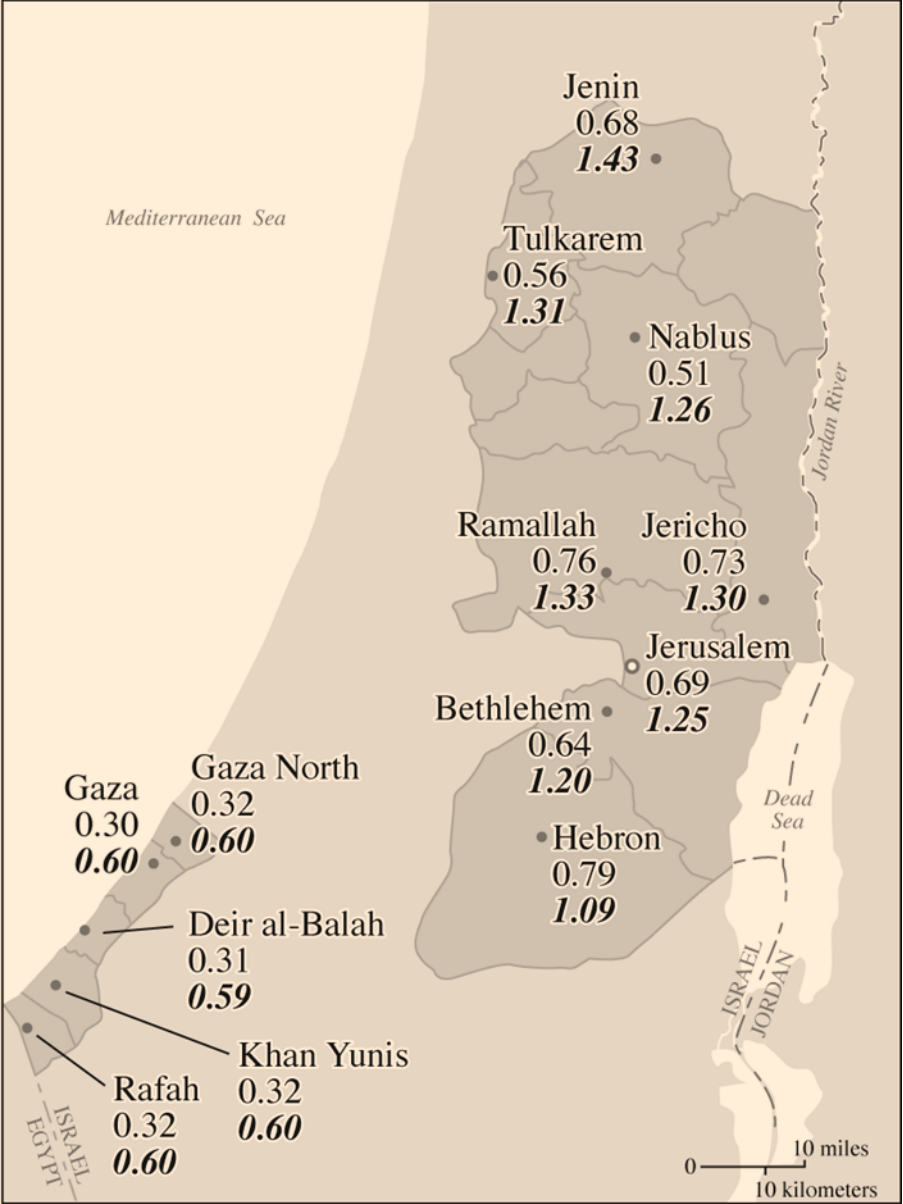
6. Some Examples

Note: All quantitative results are based on data and projections from the late 1990's. They should be taken as illustrative.

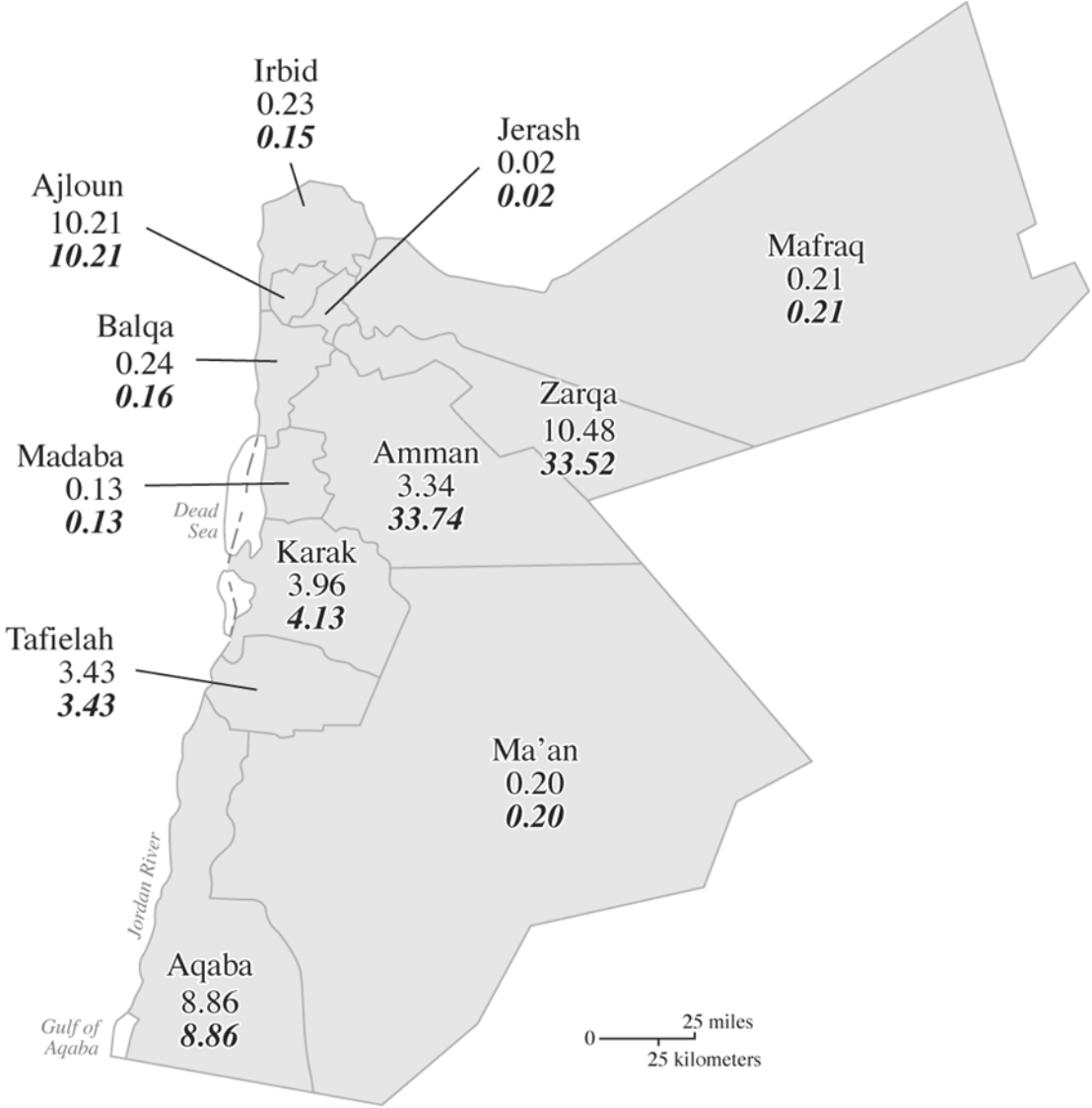
Israel: 2010: Normal and Drought Conditions



Palestine: Comparison of Full Infrastructure Scenario in 2010 With and Without Double the Quantity from the Mountain Aquifer



Jordan: Results with (upper values) and without (lower values) Expanded Infrastructure (2020)



7. Conflict Resolution

**Negotiations and the Gains
from Trade in Water Permits
and Regional Management**

- **MYWAS estimates the value of water in different locations, taking account of the special values associated with water.**
- **It also estimates the benefits to be obtained from optimal use of water resources.**

- **A water owner that uses some of the water itself does not get that water for free.**
- **It incurs an “opportunity cost” by giving up the money for which it could sell the water.**
- **It will do so if it values the water more than the money it could get by selling it.**
- **Such an owner is best thought of as selling all the water it owns and then buying back the water it needs for its own purposes.**

- **In what follows, nothing prevents the parties from asserting their claims to water ownership – their water rights.**
- **Further, water trades are made only if both parties are willing and gain from those trades.**

Ownership Assumptions (No political statement intended)

- **Three cases for the Jordan River are examined:**

A. Israel 92%, Jordan 8%; Palestine 0. (This is approximately the existing situation.)

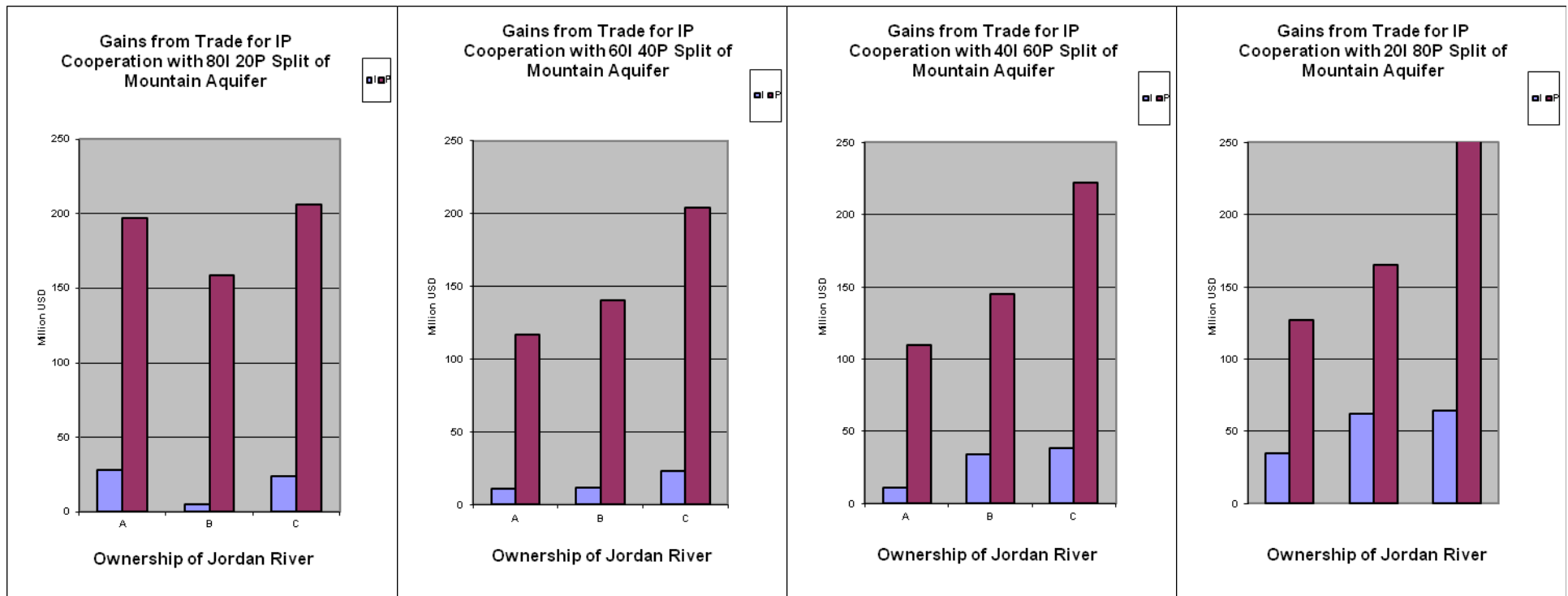
B. Israel 66%; Jordan 17%; Palestine 17%.

C. Israel 33.3%; Jordan 33.3%; Palestine 33.3%.

Ownership Assumptions (No political statement intended)

- **For the Mountain Aquifer, we examine ownership cases varying from Israel 80%-Palestine 20% (close to the existing situation) to Israel 20%-Palestine 80% by shifts of 20% at a time**

Gains from Bilateral Cooperation: Israel and Palestine, 2020



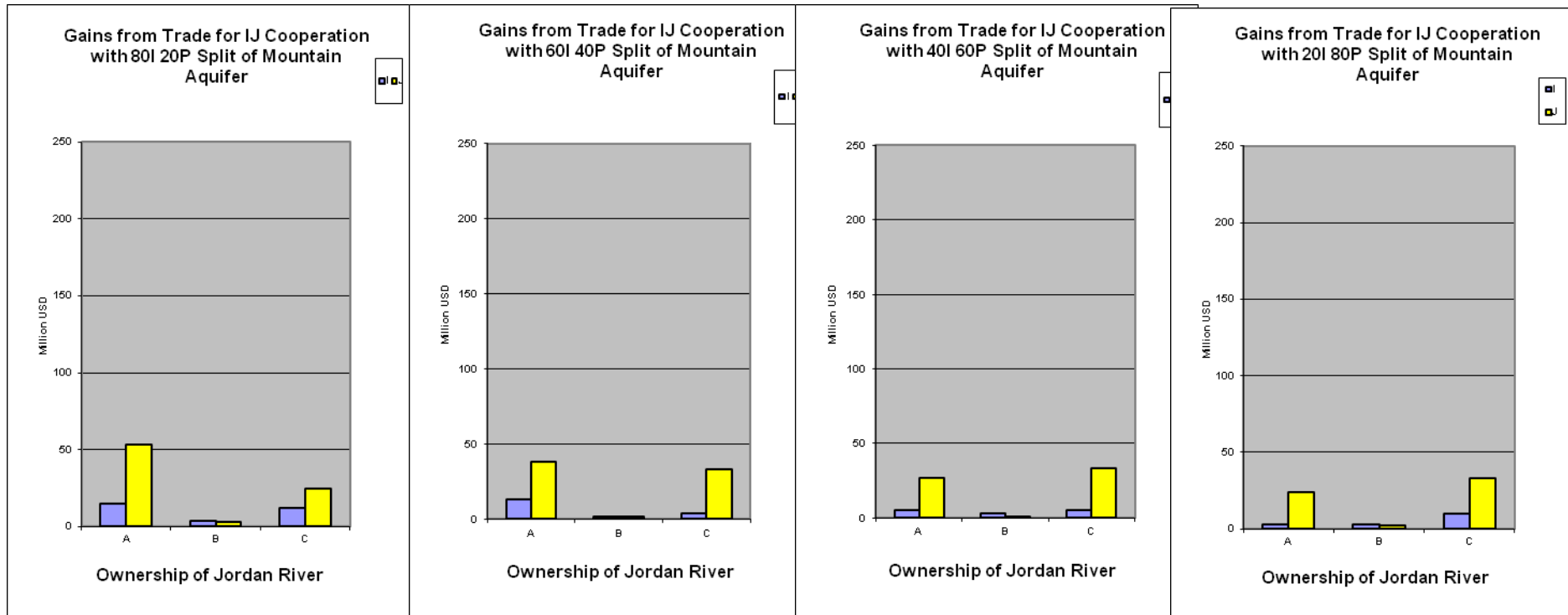
I

II

III

IV

Gains from Bilateral Cooperation: Israel and Jordan, 2020



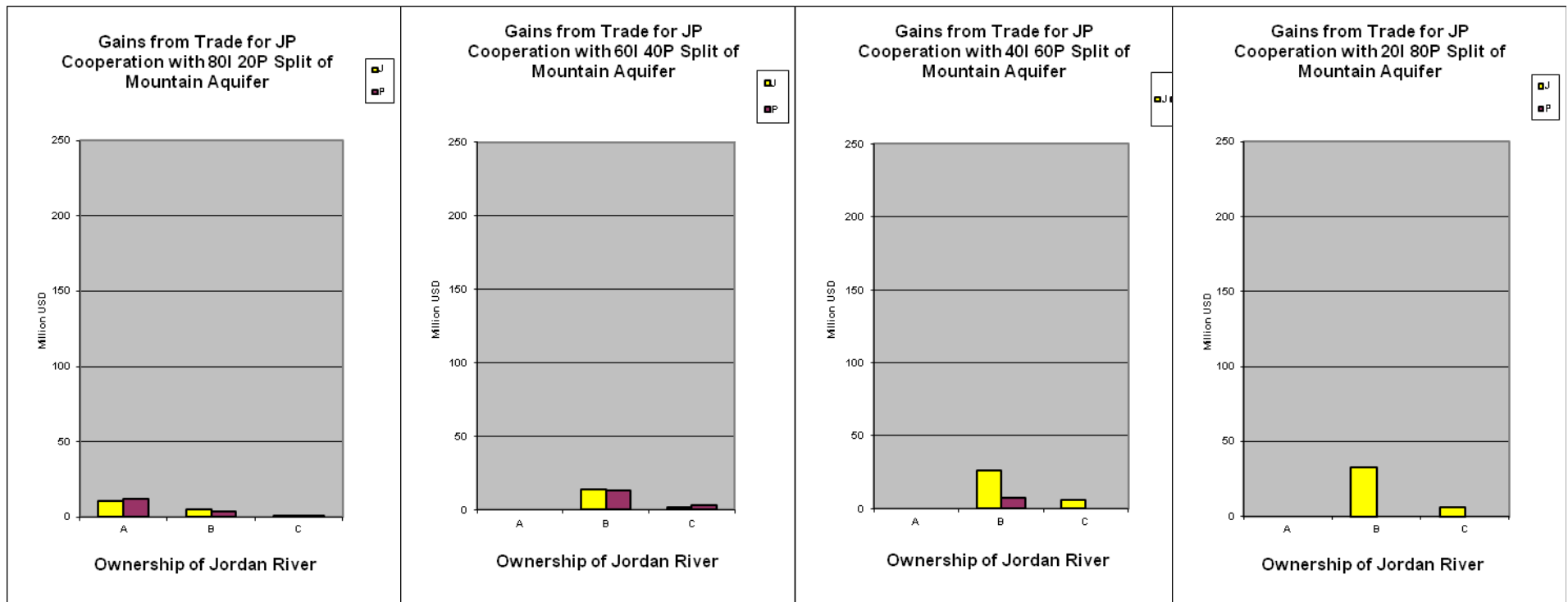
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Gains from Bilateral Cooperation: Jordan and Palestine, 2020



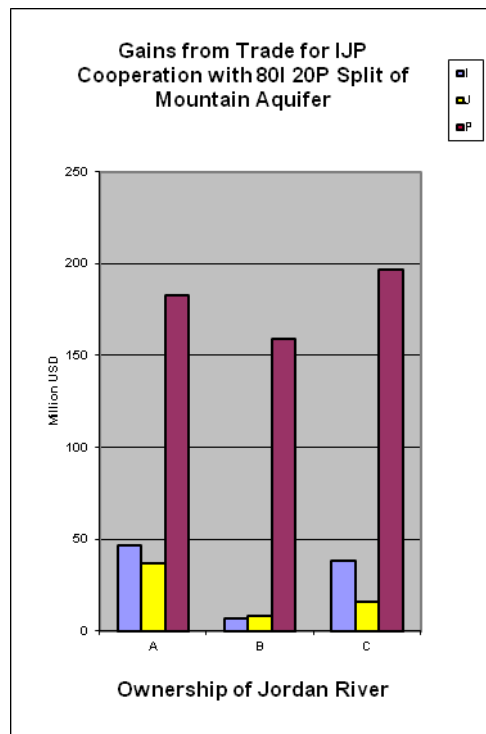
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II

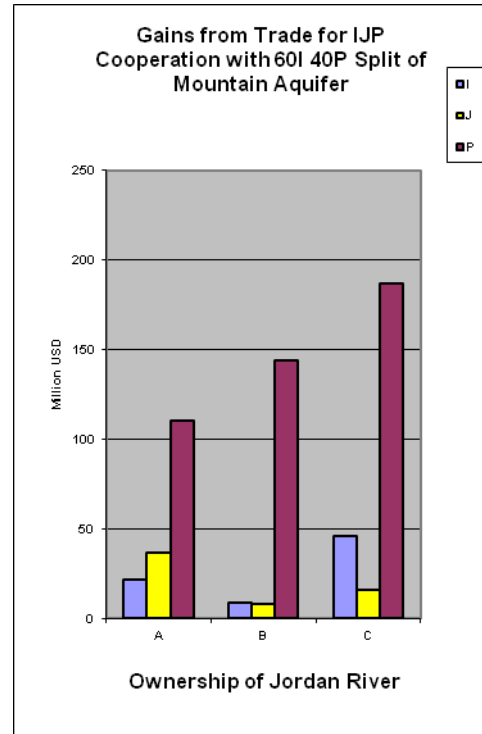
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IV

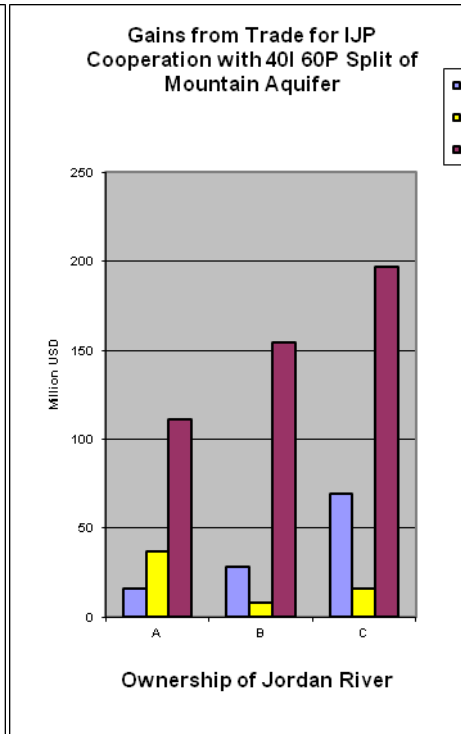
Gains from Trilateral Cooperation: Israel, Jordan, and Palestine, 2020



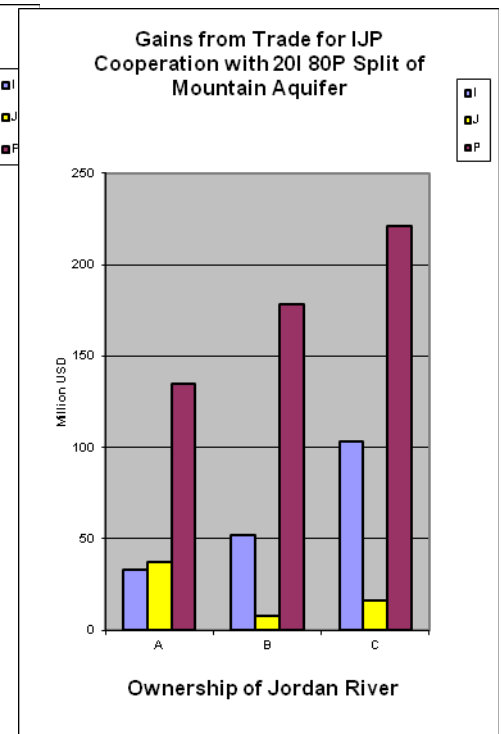
I



II



III



IV

- **It should be noted that these gains can be attained *without* waiting for a resolution of ownership claims.**
- **The parties need only establish a properly operated escrow fund.**

Possible Objections

- a. The rich country will buy all the water.**
- b. You are forcing us to sell our water.**
- c. Security issues: “hostages to fortune”.**

Abraham and Abimelech

Genesis 21: 22-34