Flexible Economic Instruments for Integrated Water Management - the Example of Progressive Production Levies

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Water Resources
Map of Major Aquifers

The actual average yearly recharge and production - m.c.m

Sea of Galilee – 650
380 – to the National Carrier

Coastal Aquifer – 250 / 370

Mountain Aquifer – 320 / 360

*Total annual potential production (average) – 1,555 m.c.m.

* Flood water – 30 m.c.m.

* Effluent – potential reuse - 400 m.c.m.
  – actual reuse – 290 m.c.m.
Water Consumption in Israel According To Sectors - 2004

Total 1,954.3 MCM

Fresh water 565.6 MCM
Marginal water 563.8 MCM

Industry 113.1 MCM (6%)
Domestic 711.8 MCM (36%)
Agriculture 1,129.4 MCM (58%)

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Water Consumption in Israel
Including supply to the Kingdom of Jordan and to the PA

FT4.44

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Palestinian Authority
Kingdom of Jordan
Domestic consumption
Industrial consumption
Agricultural consumption (marginal water)
Agricultural consumption (fresh water)


0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400

MCM

30.8 34.8 37.2 40.2 39.9 39.3 41.8 41.1 44.4
31.6 49.0 59.0 44.5 54.2 46.1 52.4 55.0 55.4
604.0 621.2 671.7 681.8 662.1 658.4 688.4 698.0 711.8
124.4 122.8 129.2 126.5 124.2 120.1 121.8 116.5 113.1
392.0 409.7 446.6 440.3 408.3 458.7 485.7 482.6 563.8
892.3 854.1 918.3 824.3 729.1 563.2 534.9 562.5 565.6
Main Water Supply System

- National Water Carrier (NWC) connects 85% of the natural water resources and regional water supply systems.
- The NWC supplies drinking water quality for all purposes.
- The NWC allows flexible and efficient operation of water resources.
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<th>Agriculture (average)</th>
<th>Industry</th>
<th>Domestic</th>
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<td>Potable</td>
<td>0.31 US$</td>
<td>0.54 US$</td>
<td>Up to 1.45 US$</td>
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<td>“SHAFDAN”</td>
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<td>Treated wastewater</td>
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<td></td>
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<td>on Salinity Level</td>
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|                     |                       |          | municipality           |
|                     |                       |          |                        |
|                     |                       |          |                        |
|                     |                       |          |                        |
Characteristics of the Coastal Aquifer

- Length about 100 km along the Mediterranean Coast, 15 km wide.
- Densely populated by urban centers, including industrial and agricultural activities.
- The water table close to the surface.
- Until recently, continuous deterioration of water quality.
- The aquifer is multi-annual capability.
- The production from the aquifer is carried out by Mekorot Co., by local municipalities, and by private producers.

The two major problems:

- Overproduction
- Pollution + Salinity (including seawater intrusion)
Chlorides Concentration in the Coastal Aquifer

Chloride range mg/l
- 0-50
- 50-150
- 150-250
- 250-400
- 400-800
- 800+

Hadera
Tel-Aviv
Ashdod
Nitrates Concentration in the Coastal Aquifer

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Mexico 16-22 March 2006
Seawater Intrusion in the Coastal Aquifer

The inland intrusion (m)

FT4.44

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Mexico 16-22 March 2006
Existing Enforcement Tools

Administrative; Legal; Economic:

• Water allocations
• Production allotments
• Storage licensing
• Monitoring and inspection
• Fines
• Water production levies
• Progressive water tariffs
## Existing Levies and Tariffs

Per 1 m³

### Levies:
- Production from the Coastal Aquifer: $-0.21$
- Variable costs of production + VAT: $-0.06$
- Total Variable Costs: $-0.27$
- Constant Cost: $-0.05$
- Total production cost: $-0.32$

### Tariffs:
- Water Tariffs: $-0.48$
- Consumer participation cost: $-0.05$
- VAT: $-0.09$
- Total price (bought from Mekorot Co.): $-0.62$
The Progressive Production Levies

1. **Low “Conservation Levy” (0.09$)**
   To reduce production while preserving production capabilities.

2. **Medium “Incentive Levy” (0.38$)**
   Bringing the production cost close to Mekorot Co. tariff.

3. **High “Preventive Levy” (0.59$)**
   To prevent production above allocations and in winter time.

Production variable cost of 0.06$ should be added.

The long term target – the prices of natural water will be close to real cost – “Alternative Cost” (0.79$).
Levels of Progressive Levies

Cents per c.m.

- Conservation Levy
- Variable Cost
- Incentive Levy
- Preventive Levy
- Constant Cost
- Recommended Production
- Winter

1000 hrs.
Difficulties facing the Implementation

- Firm opposition of the private producers.
- Physical connection to Mekorot’s Co. grid.
- The needed organizational steps.
- Building compatible financial system.
- Organizational framework for management of the inter-relationship between the partners.
- The required transitional period for gradual adjustment.
- Internal local political lobbies.
The Policy in “a Nut-Shell”

- Rehabilitation of the Coastal Aquifer and future rehabilitation of other natural water resources.
- Conservation of existing production capabilities.
- Advanced management of the aquifer as a multi-annual storage capability.
- Rehabilitation of environmental and natural values.