

Jordan's program: 'Tomorrow has arrived'

The Hashemite Kingdom of Jordan released at the Casablanca conference a 158-page report by the Ministry of Planning, titled "Jordan: Tomorrow Has Arrived—Investing in People." This document, excerpted below, presents proposals for 10 sectors of the economy: agriculture, energy, environment, health, human resources, industry, transport, telecommunications, tourism, and water.

Among the proposals are the water projects shown on the map: the Red-Dead Sea link, a water conveyance system from Disi-Mudawara to Greater Amman (350 km length), a Jordan pipeline link-up to the Euphrates in Iraq, and a water pipeline southward from the southwestern Turkey watershed of Ceyhan and Seyhan rivers (the Peace Pipeline).

Water sector

1. Water resources in Jordan are a vital factor of socio-economic growth. Any shortage or decrease of water supply is bound to have a negative effect on overall development efforts. Therefore, development of the water sector is crucial for growth in the other sectors, such as agriculture, industry, and tourism.

2. The water sector is managed by the Ministry of Water and Irrigation. The ministry sets policies and coordinates the activities of two implementing agencies, the Water Authority and the Jordan Valley Authority. Although the water sector is financed and managed by the public sector, all construction work and some maintenance work is carried out by the private sector. Due to the large volume of investment needed and due to the advent of peace in the area, private participation in this important sector is plausible and encouraged, and can be accomplished through a variety of financing schemes such as BOO and BOT.

3. Currently approximately 97% of the population has access to public [water] supply through house connections, stand pipe, or mobile tankers. Fifteen cities and towns have sanitary sewerage systems serving about 2.2 million people representing approximately 55% of Jordan's population. The per capita share in water supply stands at around 90 liters per day, taking into account the amount wasted within the network, which ranges roughly from 25% to 30%. This level of service is considered poor when compared to countries with similar circumstances.

4. Jordan suffers from limited water resources due to its dry climate and relatively scarce, uneven, and fluctuating

rainfall. Average annual rainfall ranges between approximately 600 mm to under 50 mm per year. In addition, evaporation rates are very high. Renewable water resources, surface and ground water, are currently estimated at 1,200 million cubic meters (mcm). This estimate is subject to verification because the evaluation process is not only complex and continuous but is also closely tied with the accuracy of the data and its historic sequence. The exploitable quantity is only about 900 mcm. This is attributed to lack of storage facilities, aquifers' safe yields and use by others.

5. Total water quantities consumed in 1992 for all purposes is estimated at 900 mcm including over draft vs. the demand of 1,100 mcm, the deficit of 200 mcm reflected in lesser quantity of water allocated for agriculture and rationing of municipal supplies. Consistent with the requirements of social and economic development in Jordan, the main goals in this sector are:

- To provide the maximum amount of domestic and industrial water to all population clusters.
- To extend wastewater service to 70% of the population by year 2000.
- To optimize use, care, and protection of available water resources.

6. Assuming a reasonable growth rate in population and industrial/agricultural production, the total water demand is estimated to reach about 1,700 mcm/year in year 2010 and about 2,900 mcm/year in year 2025. This represents three times the total available resources. These figures clearly show that demand far exceeds supply and that the gap is widening. To bridge the gap between supply and demand, the following options are proposed:

- To increase supply, by implementing projects such as construction storage facilities, abstraction from new aquifers, reuse of treated wastewater, rainwater harvesting, cloud seeding, desalination and importation of water from outside Jordan. . . .
- To decrease demand by implementation of technical conservation resources measures.
- To introduce certain managerial and regulatory measures to improve efficiency in the sector. . . .

The Red Sea-Dead Sea Canal

Background: The level of the Dead Sea has been falling steadily due to the diversion of the Jordan River waters, and the expansion of minerals for production from its waters by APC, and Dead Sea works in Israel. Moreover, with full development of the Jordan River Basin and of the Dead Sea east basin, the rate of water flow into the sea will be minimized. Therefore, to keep the Dead Sea level at its present level, water has to be diverted from the Red Sea to the Dead Sea through a pipeline and canal at the rate of 850 mcm per year.

Project objectives: The project aims to generate power of about 1,975 mwh/year, using the 400 meters difference in elevation between the two sites 625 mwh will be consumed

by the pumps to lift the water to the highest point in the pipeline route, which means that the net amount of power generated will be 360 mwh/year. Moreover, the project will increase the coastline in the northern part of the Gulf which will allow development in tourism. Finally the sources of potable water can be increased by desalination of sea water.

Project components:

- Pump stations
- 220 km pipeline/and open canal
- 4 reservoirs
- 4 hydro-electric power stations.

Project estimated cost: The estimated cost is US\$ millions 3,000.

Project status: A feasibility study for the project is required. It should include technical feasibility research based on adequate tectonic studies of Wadi Araba, an economic feasibility study including benefits of tourism and environmental benefits or potential hazards, social feasibility research including the capacity to create jobs, as well as an integrated development study of Wadi Araba, and a proposal for joint management of the project. Final design and tender documents are needed.

Project implementation time: The implementation time is eight years.

Water conveyance system from Turkey (Peace Pipeline)

Background: . . . The issue of a Peace Pipeline was conceived a few years ago by Turkey to serve the needs of neighboring countries in the Middle East. The Peace Pipeline will originate in south central Anatolia and convey the renewable water of Turkey's Ceyhan and Seyhan rivers south to populous areas in the region. These surplus waters are currently lost to the Mediterranean Sea.

Project objectives: To supplement the existing water resources available in Syria, Jordan, Palestine, and Israel with a large and dependable water supply to meet their present and anticipated needs; this additional source of water will allow for greater economic expansion and development of the region.

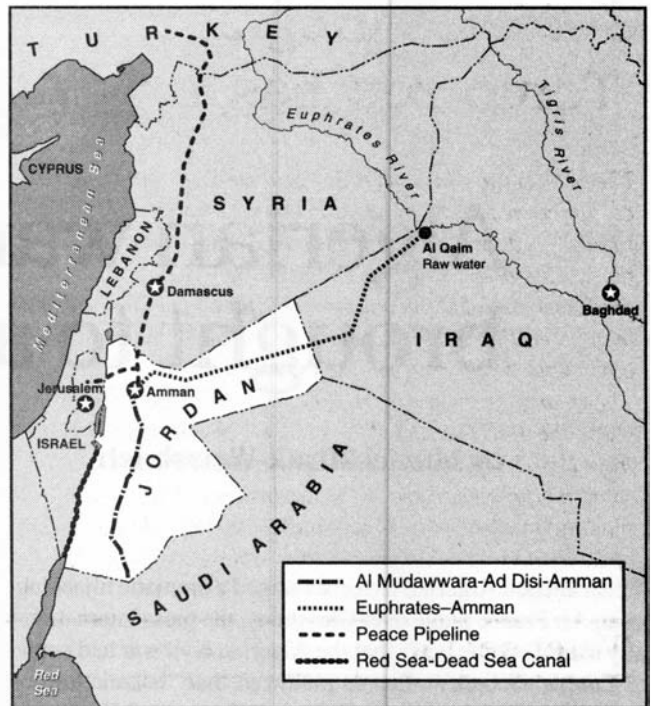
Project components: 600 km of pre-stressed concrete pipe with a diameter of 4 m, and a carrying capacity of 2 mcm per day:

- 5 pumping stations to lift water to maximum elevation of 900 meters.
- 3 hydro-electric power plants utilizing head differences.
- Several treatment plants in each country.

Project estimated cost: Based on the final actual cost of the "Great Man-Made River" in Libya, the project cost is estimated at about US\$ millions 3,000.

Project status: The project requires a prefeasibility study to be followed by a full-fledged feasibility study as well as detail design if proven feasible. This may take until end of 1997.

FIGURE 1
Water projects proposed by Jordan



Source: *Tomorrow Has Arrived. A Sectoral Analysis*, Jordan Ministry of Planning, 1994.

Project implementation time: eight years.

Water conveyance system from Euphrates to Jordan

Background: . . . In 1980 a feasibility study was conducted by the Consulting Firm of Howard Humphreys to examine the various options for the abstraction and transmission of Euphrates water to Jordan.

Project objectives: To increase Jordan's water resources by an additional 160 mcm per year to meet municipal and industrial needs.

Project components:

- An intake station on the Euphrates near Al-Haditha.
- A pump station to lift the water to a treatment plant.

Conventional treatment plant:

- 3 pump stations.
- 600 km of twin 1.2 m steel pipeline each carrying 80 mcm.

Project estimated cost: The estimated cost is US\$ millions 1,500.

Project status: A feasibility study is in hand but should be updated and followed by a detail design.

Project implementation time: Implementation time is four years.