

SUMMARY REPORT SUPPLEMENT

Jordan

Most Probable Scenario

In the Summary Report AMER used "best scenario" data along with AMER's more pessimistic comparative figures to demonstrate that either way, the supply and demand picture reveals a projected chronic water shortage whose cumulative effects will become increasingly serious leading to a large-scale crisis in the medium term, perhaps as soon as 1995. AMER continues to hold to that assessment. We believe that the most probable outcome will be the supply and demand configuration without Unity Dam:

Supply and Demand Without Unity Dam (Mcm/yr)

<u>Year</u>	<u>Supply</u>	<u>Demand</u>	<u>Balance</u>	1985	678
834	-156	1990	693	958	-265
1995	736	886	-150	2000	785
936	-151				

For comparison's sake, the following table indicates the supply and demand projections with Unity Dam in operation sometime between 1995 and 2000:

Supply and Demand with Unity Dam (Mcm/yr)

<u>Year</u>	<u>Supply</u>	<u>Demand</u>	<u>Balance</u>	1985	678
834	-156	1990	693	958	-265
1995	859	886	- 27	2000	908
936	- 28				

The following assumptions underly AMER's position:

1) Unity Dam will not be completed and fully operational by the year 2000 because of the delays caused by the ongoing negotiations with Israel over the dam and the probability that they will not be concluded imminently. Although Jordan is cautiously putting in place the earthwork foundations, real construction cannot begin until the negotiations are completed and financing is in place. Jordan will have more difficulty raising the necessary \$350 million or so needed because of the deteriorating condition of its economy, a tightening international money market, and also lenders are going to want to be assured of stable and secure conditons which depend on the outcome of the negotiations with Israel. However, we believe that Jordan will ultimately get the

money, though the costs will rise with delays.

2) Combined M&I consumption will treble by 2010 and the population of Jordan will increase by 177%, from 2.7 million to 7 million by 2015 (just short of 5 million by 2000)

3) Demand will exceed sustainable supply throughout the decade of the 1990s and that the government will cover the shortfall by overpumping its water sources as short term policy. Should Unity be completed by 2000, all of its water will have to be used for M&I with a commensurate reduction of irrigation water to the Jordan Valley from about 570 Mcm/yr to about 325 Mcm/yr of which at least 30% would be from return flows. Interbasin transfers will be exploited maximally and any increase in agricultural production will have to come from improved efficiencies and agricultural technologies. The alternative would be to overpump the Qa-Disi aquifer which is not an acceptable long term option.

4) Drip irrigation will be widely adopted but no large scale changes in the cropping patterns will occur, though it is assumed a start will be made toward introducing marketable low water consuming crops.

5) A 1-in-20 drought ratio will obtain. This is a best case position since droughts are so unpredictable. Between now and 2010 (probably sooner) there will certainly be more drought. It should be borne in mind that in the Jordan River basin, two consecutive years of moderately severe drought would result in a loss of water equivalent to about one year's total supply in both Jordan and Israel.

6) Jordan will be allowed to maintain the intake tunnel of the East Ghor Main Canal clear of obstructions.

Price Elasticity

Normally, the price of water would be an important determinant of consumption: lower prices would lead to higher usage, higher prices to lower consumption. However, in Jordan and Israel two other factors counterbalance the influence of price: these are severe limitations on the amount of available water and the subsidization of water costs. These factors have disrupted the usual pattern of price elasticity where Jordan Basin water is concerned. In Jordan, despite heavy subsidization of agricultural water costs which keep prices artificially low (especially in the Jordan Valley), farmers receive only the quantity of water required to irrigate their crops, and in reality, often less than the volume needed because of poor delivery systems and loss. Moreover, only farmers who have paid their water accounts receive water deliveries. It should be noted that as of June 1989, the price of agricultural water in the Jordan Valley has risen from 3 fils/m³

to 6 fils/m³. Thus, scarcity (supply) controls price in Jordan and Israel.

This situation will improve somewhat, but still generally obtain, when the conversion to drip irrigation is completed. Consequently, although water prices do affect to a degree agricultural consumption of water, in Jordan the overriding determinants are limitations on the quantity of available water and the quality of the conveyance systems. For example, in 1987, owing to good rainfall, there was virtually no increase in the overall amount of water used. What determined consumption was not price but, primarily, availability and also poor delivery and time (a single year was insufficient time to change cropping patterns or increase irrigation).

If the price of M&I water were raised to its true economic level by the removal of subsidies, the volume of domestic water used would probably be insignificantly affected because of scarcity. The per capita consumption of water in Jordan is already quite low at 81-83 l/c/d, and cannot rise unless considerably more water becomes available, which is highly unlikely. If endemic meter cheating were brought under control, a change in the price structure would affect domestic consumption only marginally. What will impact on domestic usage is the 3.8 percent annual growth rate of Jordan's population.

Jordan's industrial sector, though moderately subsidized, is not a heavy consumer of water at present owing, again, to scarcity and the relatively small size of the sector. However, industrial demand for water is sharply rising and is expected to quadruple in the next fifteen years. This fact combined with rapid population growth will intensify the competition for water allocations among the three sectors. Over 40% of all water will be consumed by M&I sometime between 2005-10. In these circumstances prices and subsidies can be expected to have an effect on the sectoral allocation and consumption of water, but not necessarily on the total national usage which will still be determined by limited availability. All in all, the current price structures and subsidies serve mainly to make Jordanian products competitive rather than as determinants of consumption.

The one sector of Jordan's society most sensitive to price fluctuations is the country's poor--the rural villages, refugee camps, and the urban poor. Among these groups, prices clearly do govern use. Higher prices compel them to use less, and since they are already on the margin of acceptable health standards, the consequence would be a lowering of the quality of life for a significant segment of the population.

Newly Received Information

Information has very recently been received from Jordan that must be taken into account here. If this information is verified, it may require changes in some aspects of the assessments in the Summary Report. At this juncture, this new data appears to support AMER's more pessimistic assessment of supply and demand.

1) As indicated above, the price of water in the Jordan Valley has risen from 3 fils/m³ to 6 fils/m³.

2) Of far greater import is a significant downward assessment by some Jordanian experts of the safe-yield figure for the Qa-Disi aquifer: from 100Mcm/yr to 50 Mcm/yr. If this calculation is verified, the implications for Jordan's future hydrological condition, its water policies and development plans, would be great and Jordan's dependence on Yarmuk water would become all the more critical. Recent information from Israel if confirmed will verify that the Israelis have been and are now regularly taking 100 Mcm/yr from the Yarmuk.

The Qa-Disi constitutes the base or "mother-lode" of almost all of Jordan's other groundwater sources. When the groundwater level at Disi is lowered, the other groundwater levels will decline also and so too will the levels of the overlaying aquifers (Qa-Disi is a deep aquifer). If Qa-Disi is lost, Jordan will suffer a significant drop in the levels of all the other aquifers.

If this new estimate were to become firm, it would mean a significant reduction in the estimates made for the two most reliable sources of new water for Jordan, the Qa-Disi aquifer and recycled water. New information indicates that Jordan has increased the use of recycled water (return flows) from 9 Mcm/yr in 1986-87 to 30 Mcm/yr at present. The Yarmuk is not considered as reliable a source currently owing to the inter-riparian politics involved and the state of the negotiations of Unity Dam. We had estimated that between them, Qa-Disi and recycled water could provide an additional 132 Mcm/yr of safe-yield water. Using the new figures for both those sources, we now calculate that the average would be between 90-95 Mcm/yr down to 2010, making the government's plan for developing 934 Mcm/yr of new water by the year 2000 all the more unlikely and a successful outcome of the Unity negotiations all the more urgent.

Israel

Most Probable Scenario

In the Summary Report AMER projected that Israel, like Jordan,

would suffer chronic water shortages throughout the decade of the 1990s whose cumulative effects would lead to a crisis in the medium term, perhaps as early as 1995. AMER continues to adhere to that prognosis, and for the same basic assumption that govern the Jordanian case: neither country as yet perceives its water problems sufficiently critical as to risk the political and social dislocations that could result from the economic restructuring and changes in consumption patterns that would be necessary for solving the water crisis. The political will and leadership is lacking. Hence, each responds with ad hoc or short term (and short-sighted) actions that on the whole exacerbate the problem. In the long term, the most stable and realistic way to deal with water issues in the Jordan Basin (or any other inter-riparian basin in the region) is by the creation of a basin-wide authority with sufficient funds, expertise, independence, and power to function effectively. But such an agency must await political solutions to the basin's seemingly intractable inter-riparian hostilities.

AMER's position is reflected in the following supply and demand tables:

Israel and Occupied Territories Combined
(Mcm/yr)

Year	Supply	Demand	Balance
1940	2140	-200	1985
-150		1990	2100
1995	2000	2200	-200
2100	2270	-170	2000

Israel (Green Line Only)

Year	Supply	Demand	Balance
1940	-200	1800	1985
1995	1850	2080	-230
2125	-165		2000

Occupied Territories*

Year	Supply**	Demand***	Balance
	414	+61	1985
	-60	1990	370
1995	340	355	445
		460	-120

* Because reliable supply and demand data on the Occupied Territories has been very spotty for certain years, and because Israeli sources almost always combine the Territories' statistics with those of Israel, these figures must

be considered as soft. They have had to be extrapolated or estimated from the few reliable numbers we possess. But

the trend and scale of the balance column we believe to be accurate.

** Covers only the West Bank and Gaza proper; the Israeli portions of the Yarkon-Tanninim and Northeast aquifers have

been included by estimate in the Israeli figures above. Also reflects overpumping of the Territories' aquifers and transfers to Israel.

*** Includes Israeli settlements' demands. These figures reveal that demand in the Territories is severely repressed

by scarcity.

The following assumptions underly AMER's position:

1) No fundamental changes in cropping patterns will occur, though low some low water consuming crops will be introduced and there will be reductions in such high use crops as bananas and cotton.

2) Because of Israel's settlement policies on the one hand, the Intifada on the other, combined with the current domestic political stalemate within Israel, it cannot be assumed that the present hydropolitical relationship with the Occupied Territories will remain unchanged for a decade. If, for example, Israeli settlements increase, the impact on the water situation in the Territories will be significant because the settlers use about five times as much water as the Palestinians. We do assume, however, that Israel will not give up the Territories or even grant extensive autonomy without guarantees for the use of about as much water--20% of Israel's needs--as at present.

3) We have assumed that Israel has been taking about 100 Mcm/yr from the Yarmuk.

4) The same assumptions concerning the Unity Dam expressed for Jordan apply here.

5) A 1-in-20 drought ratio has been assumed.

Price Elasticity

The comments made under Jordan regarding price elasticity as concerns water prices in the Jordan river basin apply generally to Israel, that is, while prices do affect consumption to a degree, the overriding factor is water scarcity (or supply) and distribution which are the main determinants of price. Elasticity operates somewhat differently in Israel than in Jordan because the system of subsidies is more complex and costly, there is relatively

little meter cheating, and while loss and delivery need improvement, they are better than in Jordan. On the whole, prices in Israel have a larger impact on consumption sectorally than in Jordan, but the controlling factor in the price/consumption relationship nationally remains limited supply.

Newly Received Information

As in the case of Jordan, new information has recently been received from Israel that must be verified but which tentatively reinforces AMER's assessments and projections.

1) Israel is in fact now regularly taking 100 Mcm/yr from the Yarmuk River.

2) No significant new quantities of water are being produced. The supply remains static with one exception, cited in 3) below, which is insufficient to make much impact.

3) The Gush Dan Region project is now producing 90 Mcm/yr of recycled effluent, an increase of 20 Mcm/yr over 1987-88. This water is used entirely to recharge the Coastal Plain aquifer.

4) Subsidies have not been reduced, but have increased. (We are attempting to determine by how much).

5) Water prices have increased across the board. Again we are attempting to get details but we have some unverified averages: agricultural and industrial water both average 19.5 agoras/m³ countrywide--this is up from a legally mandated cap of 12 agoras/m³ for industry in 1987-88--and domestic water averages about 30 agoras/m³ nationally. The exchange rate at the time this information was received was 1.7 agoras=\$.01. That rate has since changed.

6) Finally, and perhaps most significantly, the total annual deficit continues to run between 1700-1900 Mcm. This indicates that the status quo--no water reforms--remains intact.

Source: Jeshoa Schwarz (via Ofira Seliktar)

- 1) Prices (average countrywide)
 - Agriculture--19.5 agora/m³
 - Industry-- " " "
 - Domestic-- 30 " "
- 2) Subsidies: 16 million NS, total water subsidies *on budget*
(check this figure with Ofira again)
- 3) Water Production: No significant amounts of new water are being produced. The Gush Dan Region recycling project is now producing 90 Mcm/yr, part of which goes to recharging the aquifers (probably the Coastal Plain, mainly)
- 4) Israel now taking 100 Mcm/yr from the Yarmuk. Schwarz claims authorities having trouble measuring the flow of the Yarmuk accurately.
- 5) Israel's total annual deficit is now between 1800-2000 Mcm (Schwarz)
- 6) Political Parties: Labor and Likud both undergoing organizational and personnel changes; each is facing major power struggles over choosing new leadership; both are under considerable internal stress.
- 7) Likud: Sharon/Levy coalition looking for an issue on which to oust Shamir; until the new leadership issue is settled there will be no bold or risky political actions; both the Shamir/Arens and Sharon/Levy camps are rounding up allies in the Central Committee and wherever they can in other voting bodies of the party.
- 8) Labor: Labor is faced with the same problem as Likud; both the right and left wings of the party are dissatisfied with Peres; Haim Remon and Yossi Belin on left and Rabin on right; Peres is able to hold on because there is no candidate acceptable to both camps; the left prefers Peres to Rabin; labor is under great pressure to make more overtures to the Sephardim who feel they have been neglected by Labor.
- 9) In these circumstances, there is little scope in either party for developing and advocating new bold initiatives for dealing with water issues.