8053

WATER ISSUES IN THE MIDDLE EAST

JORDAN: POLITICAL, ECONOMIC, AND STRATEGIC (1987)

Associates for Middle East Research (AMER) Water Project
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Recommendations for Jordan

1. Water must be accorded top priority in Jordanian national planning.

2. The Unity Dam is essential, whatever the political and economic costs of its construction. This is the last readily accessible source of water for the already scarce municipal needs of northern Jordan. If Unity is constructed expeditiously, that is, by 1995, it will give Jordan the lead time to resolve some of its economic and demographic problems, to develop more expensive water reserves, and to work for the regional water-sharing schemes that are ultimately the only answer to water scarcities in Jordan and elsewhere in the Middle East.

3. Jordan must therefore continue to talk with Israel and Syria until an acceptable arrangement over Unity Dam (and the East Ghor Main Canal) is reached. There is no other viable option. Military action, whether unilateral or as part of an Arab alliance, could not succeed, and would create more domestic and international problems than it would solve.

4. With stocks of available water at the point of total utilization -- and some areas are already in overdraft -- programs for efficiency and conservation assume major importance for Jordan. This requires better knowledge, better planning, and better implementation. Efficiency and conservation also entail safeguarding existing water stocks. Water quality must be accorded a priority at least equal to that of water quantity.

5. Public awareness of the seriousness of water problems is an essential ingredient to reaching the necessary level of compliance with measures for efficiency and conservation. A sustained educational campaign should be undertaken through the schools and the media to increase understanding and raise the level of compliance.

6. Significantly improved efficiency throughout the water sector entails better management, enforcement, and physical systems.

7. The creation in 1987 of the new Ministry of Water and Irrigation provides an opportunity to reduce redundancies and departmental rivalries. The planning and management of water should be streamlined, manpower needs should be reassessed and rationalized, and new legislation should clearly authorize MOWI to manage all aspects of water planning, development, and operation, superceding all previous agencies and authorizations. MOWI should have a qualified staff in its central plan-

ning division that does not mainly reflect the interests of either the Jordan Valley Authority or the Water Authority of Jordan. MOWI must pay its staff adequately.

8. The leadership of MOWI is of paramount importance. Given Jordan's political processes and the nature of the country's hydraulic problems, the leader of the water sector must be a strong personality, respected within the professional engineering community, politically astute and able to balance the interests of primary and secondary actors, a good manager capable of integrated planning. To function, he must enjoy the firm support of the King, the Prime Minister, and the Crown Prince. Vision and imagination would be valuable assets. While it is not likely there are too many candidates possessing all of these ideal attributes, the man who leads the water sector must at minimum be professionally competent, a respected leader, and a good manager and planner. It remains to be seen whether the present Minister of Water and Irrigation possesses the essential qualifications.

9. Enforcement, with voluntary compliance as its corollary, is now a serious problem. "Cheating" is all too commonplace. It involves avoidance of the meters that measure allocations and assess fees, and discharge of untreated wastes into the ecosystem, evading expensive treatment processes. Improvement will entail more effective monitoring by MOWI, as well as education to rob non-compliance of its respectability.

10. Existing water distribution networks, both urban and agricultural, leak like sieves. In some areas, only half the water produced actually reaches the consumer. Urgent action is needed to repair municipal pipes and reline irrigation canals. The savings realized will go far to reducing Jordan's shortfall of available water in the coming decade.

11. Wastewater treatment is both a health requisite and a significant way to augment supplies. Construction of treatment facilities is an urgent priority. Effluent producers should be persuaded -- and compelled -- to cooperate. The reuse of purified wastewaters could increase Jordan's available water supply by 10% or more.

12. Agriculture, the single most significant user of water, must become more efficient. Horizontal extension of irrigated cropped areas should be strongly discouraged. Full conversion to drip irrigation should be a top priority. Water saved through conversion to drip and through introduction of less water-consuming crops can be utilized to intensify production without extending the area of cultivation. The use of immigrant agricultural workers, whose remittances home offset their economic productivity, should be phased out quickly.

13. Water availability and water consumption should be important criteria in evaluating plans for new industries.

14. The most effective water management and the most visionary development planning will ultimately founder if Jordan does not reign in its population growth. Per capita domestic water use is already low by

comparison to other countries, but it grows in direct proportion to population. If Jordan's population continues to double every two decades, its per capita water use will soon be depressed below the minimum levels required for health and hygiene. The rate of Jordan's population growth must be reduced as quickly as possible. (The same prescription can and should be made for all of Jordan's fellow riparians.)

15. Questions of water pricing and subsidies need to be re-examined. Although Jordan's stated policy is to recover all operation and maintenance costs, as well as some at least of investment costs, the implementation of that policy is deficient. Not only is collection ineffective, but the subsidies provided to some sectors have not been changed for many years, during which time costs have skyrocketed throughout the economy. The 3 fils per cubic meter rate for Jordan Valley irrigation is especially in need of revision. A more equitable pricing system, in line with stated policy, might discourage profligate uses and encourage farmers to convert to crops and devices that would conserve water. One caution, however. Monitoring and information must accompany such measures to insure proper attention to drainage. Otherwise, soil salination could result.

16. While examining pricing structures, Jordan must avoid falling hostage to the interest groups in its political system -- which could subvert the whole purpose of equitable distribution of supplies and costs. The goal is not to undermine the stability of existing political arrangements, but to educate the populace to water as an issue of national survival. Water is too vital to be a pawn to lobbies -- of whatever description.

17. Better documentation and planning are required, and should be in the hands of Jordanians. In particular, Jordan needs to make better use of its own well-educated population to solve water problems. A national entity should be established, funded, and equipped to serve the needs of the water sector. This entity should create a water database, coordinate the flow of information, design operational models, and generate needed research. (The present Water Research and Study Center at the Jordanian University could be funded to serve as the national entity.) Academic training programs in water sciences and associated fields should be upgraded. The end result should be to provide Jordan with the structures and depth of expertise to produce most of its own water studies, and to evaluate independently the work of outside consultants.

18. Although it would be politically difficult at present for Jordan to downgrade agricultural production so as to conserve water, the government should undertake serious contingency planning toward this end. Such a change would essentially restructure Jordan's economy. Agriculture consumes 80% of Jordan's annual water supply, although it produces less than a tenth of GDP and only a fifth of exports. Light industry would use only a fraction of the amount of water, and would yield thirty times more input to GNP than agriculture per unit of water used. A 30-50% reduction in agriculture would solve most of Jordan's water problems for the foreseeable future. This would obviously entail economic

and social transitions, as well as psychologically difficult rethinking on questions of food security. Advance preparation is essential, especially for manpower training, which is why early planning is needed. It can only be achieved by phases.

19. Regional planning is the only long-term solution to Jordan's water problems. Jordan is already promoting schemes for an Arab Economic Community. Integrating water sharing into such a laudable economic plan would strengthen its chances for success and constitute a first step toward region-wide cooperation involving Turkey. Jordan should increase its efforts toward this end.

Recommendations for the United States

Framework. The quality of American influence on any Middle Eastern issue is proportional to the trust given the United States by the concerned actors. The need of U.S. involvement in an issue does not necessarily imply trust -- it only reflects need. That is the state of affairs as regards the Unity Dam negotiations. Jordan needs American mediation, but perceives the United States as immutably pro-Israeli and untrustworthy as regards Jordan's interests. This attitude is found throughout the Middle East in one degree or another. Indeed, many studies and polls have shown a uniform anger and mistrust of the United States among the youth, the next generation of leadership in the region.

Thus, America's contribution to easing Jordan's water problems is limited by the distrust the United States inspires through its Arab-Israeli policies. The United States could not act with full credentials as an honest broker unless it altered its special relationship with Israel, or, alternatively, developed an effective peace strategy that produced a satisfactory Arab-Palestinian- Israeli agreement. Since both prospects are dim for the foreseeable future (and nil so long as the United States cannot deal with the Palestinians), the only way for the United States to be effective is through deeds.

Deeds in this instance can take the form of aid and political support for Jordan's critical water requirements. This study has established that Jordan, together with Israel and the West Bank, will face a severe water crisis after 1995. The region will not actually run out of water, but it will feel that way. The need will far outstrip the supply, and overuse will degrade and diminish that supply so that citizens will have to deal with the twin spectres of scarcity and health hazards. The United States can and should offer financial and technical assistance to help Jordan develop its resources and undertake the necessary economic restructuring. The United States can and should seek to facilitate regional cooperation on water. The stability and peace of the region are at stake, and with it vital U.S. interests.

1. In the absence of progress on the Middle East peace front, the United States should emphasize in its Middle East policies negotiated cooperative settlements of water-related issues, either as a mediator-

s a facilitator. Water problems can in some instances
operation where other political/strategic issues remain dan-
recalcitrant. By moving on an important salient where there is
of progress, the United States can, if even moderately
successful, improve the atmosphere for talks on other fronts. The longer
there is failure to make progress on the Arab-Palestinian-Israeli peace
issue, the closer to serious conflict the region moves. Some water
issues can be mitigated through negotiations and deeds independent of
other large conflictual matters, and could buy some urgently needed time
to find formulas for a larger settlement.

2. The stability of the Jordan basin will be determined by the
outcome of the Unity Dam negotiations. The United States should pursue
its mediation efforts between Jordan and Israel with sensitivity, energy,
and utmost patience. The United States should be prepared for a long,
difficult set of exchanges. It should seek to dissuade the parties
(Israel, Jordan, and peripherally Syria) from making unreasonable
demands, and should be prepared to offer inducements toward this end.
Jordan's vulnerability must not be exploited by the parties or the
mediators as the result could be destructive domestic instability and
dicalization in Jordan.

3. The United States should provide Jordan with partial funding
echnical assistance for the Unity Dam, and should support Jordan's
s to obtain financing from international sources.

The United States should seize the opportunity afforded by the
otiations to promote a Johnston-type plan (without resurrecting
al) for sharing the Yarmuk. Such a scheme should be a building
other regional water plans. The United States should, on the
elsewhere, encourage basin-wide or region-wide planning on

United States should aid Jordan to repair its water
xpand its wastewater treatment capacity, and to adopt con-
logies. Insofar as technology offers answers to Jordan's
the United States should facilitate the transfer of the
technologies to Jordan. Aid funds should be earmarked

uld be encouraged to downgrade agriculture in favor
he United States should provide long-term planning
conomic restructuring, and should assure sufficient
ansition to cushion against serious economic and
lanning should consider, among other questions,
-term food security for Jordan's population.

e encouraged to adopt policies to reduce the
The allocation of U.S. aid funds to study
ducement.

uld provide Jordanians with training and
levant water-related branches of science,
trol, and economics. This would enable
y-

Jordan to undertake anticipatory planning and develop implementation strategies. Startup funding should be made available for a national water planning and documentation entity.

9. The United States should encourage Jordan to look to long-term regional planning for the solution of its water problems. This could take place within the context of Jordan's own proposal for an Arab Economic Community, which the United States should also encourage -- publicly or privately, whichever is deemed more appropriate.

10. Improved legal structures are badly needed for settling water disputes. In some instances, e.g. groundwater, there is little consensus regarding the principles to govern shared resources. In all cases, mechanisms for monitoring and enforcement are needed to implement sharing agreements. The United States should work with other states to promote international legal structures relating to fresh water, in the Middle East and elsewhere.

11. In the U.S. government as in Middle Eastern countries, the issues of international fresh water use, allocation, and preservation suffer badly from fragmentation. We recommend the formation of a special interagency group, encompassing both executive and legislative branches, to coordinate American policy formation in the realm of international fresh water issues. This group should serve functions of coordination, data collection, policy and project assessment, education, and review. Its purview should include the technological, political, socioeconomic, strategic, and legal dimensions of international water use issues. Its membership should include, among others, representatives of the departments of State, Energy, Defense, Agriculture, the CIA, the DIA, the USGS, the Army Corps of Engineers, USAID, the EPA, and appropriate congressional committees (Senate: Foreign Relations, Energy and Natural Resources, Environment and Public Works; House: Foreign Affairs, Interior, Science and Technology).

There is one scenario that, albeit remote, warrants mention because it would yield by far the most beneficial long-term results for all concerned. That is a comprehensive water development and sharing plan for the Jordan and Euphrates basins, if not for the entire Middle East, promoted and initiated by the United States and ultimately to be supported jointly by the United States, the Soviet Union, the European Community, and Japan, in partnership with the key Middle Eastern actors who share the major river basins plus the GCC states. The scope and boldness of such a plan could cut through many of the recalcitrant problems that frustrate piecemeal attempts. But in view of regional hostilities, it seems at present a forlorn hope. However, the very stubbornness of Middle East problems demands unflagging imaginative efforts. Some apparently hopeless issues have yielded to persistence, courage, and determination.

Chapter 1
DEFINING THE PROBLEMS

1.1. Identification of the Jordan River System

The primary purview of this report is on the Dead Sea basin within the Hashemite Kingdom of Jordan. This encompasses the Yarmuk river, the main stream of the Jordan river south of the confluence with the Yarmuk, the eastern tributaries of the Jordan river between the Yarmuk and the Dead Sea, the eastern tributaries of the Dead Sea south of the mouth of the Jordan river, including the Wadi Araba, and groundwater associated with this watershed as well as elsewhere within the Kingdom (see Figs. 1.1 and 1.2).

Briefly, Jordan is a semi-desert country with a land area on the east bank of the Jordan River of about 96,000 sq km. The climate varies from semi-arid to arid. Rain falls only in the winter months, and even in winter is sporadic in the desert areas, and is otherwise unevenly distributed. Rainfall exceeds 350 mm/yr, the minimum required for reliable rainfed agriculture, over only 2% of the total land area, principally in the northwestern highlands where the population is concentrated. The rest of the country receives less than 250 mm/yr. Until the 1960s, only limited use was made of Jordan's surface waters. Ground water was used for domestic and industrial purposes, while farming was confined mainly to rainfed agriculture and animal husbandry(4092).

Irrigated agriculture in Jordan is limited by lack of water in both the uplands and the Jordan Valley, and by difficult terrain in the deep riftside wadis that cut from the upper plateau to the Jordan Valley. However, owing to relatively moderate winter temperatures, year-round cultivation can be practiced in the Jordan Valley. The total irrigable area of Jordan is estimated at about 58,000 ha, most of it, some 36,000 ha, in the Great Rift Valley north of the Dead Sea(2820). For reasons of terrain and water shortage, only about 43,528 ha are currently cultivated(4092). The risk of aquifer depletion, together with lack of storage and transport facilities, constrain further extensions of the irrigated area.

The techno-hydrological dimensions of the issues under analysis have already been examined in Phase I of this project (see *Water Issues in the Middle East: Data and Analysis of the Jordan River System* May 1987)(4220). This report will concern itself with the analysis of such matters as policy formulation, political processes, regional riparian relationships, the probability of conflict, and the political and economic options open to Jordanian policy makers for the mitigation or resolution of water problems.

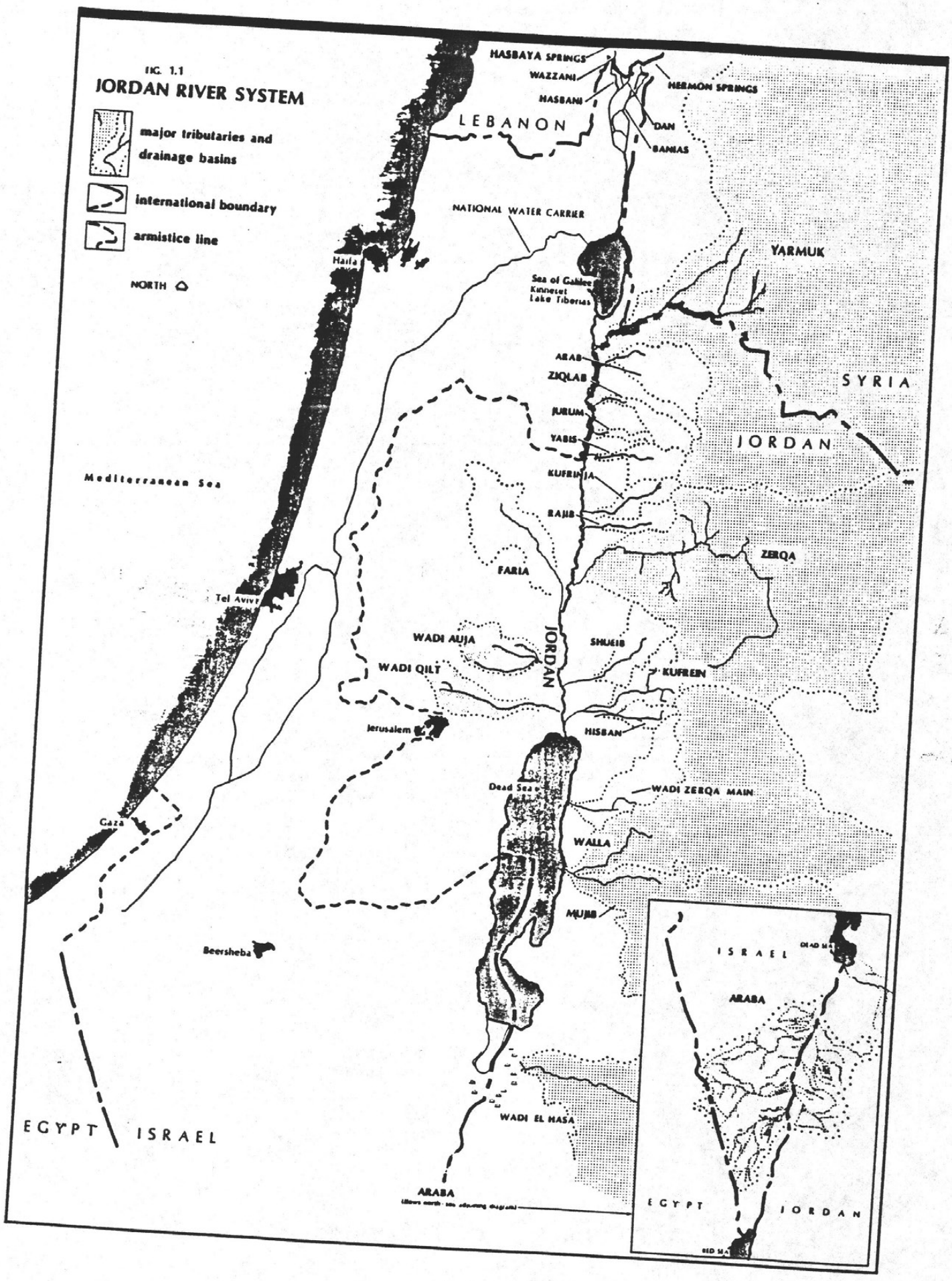
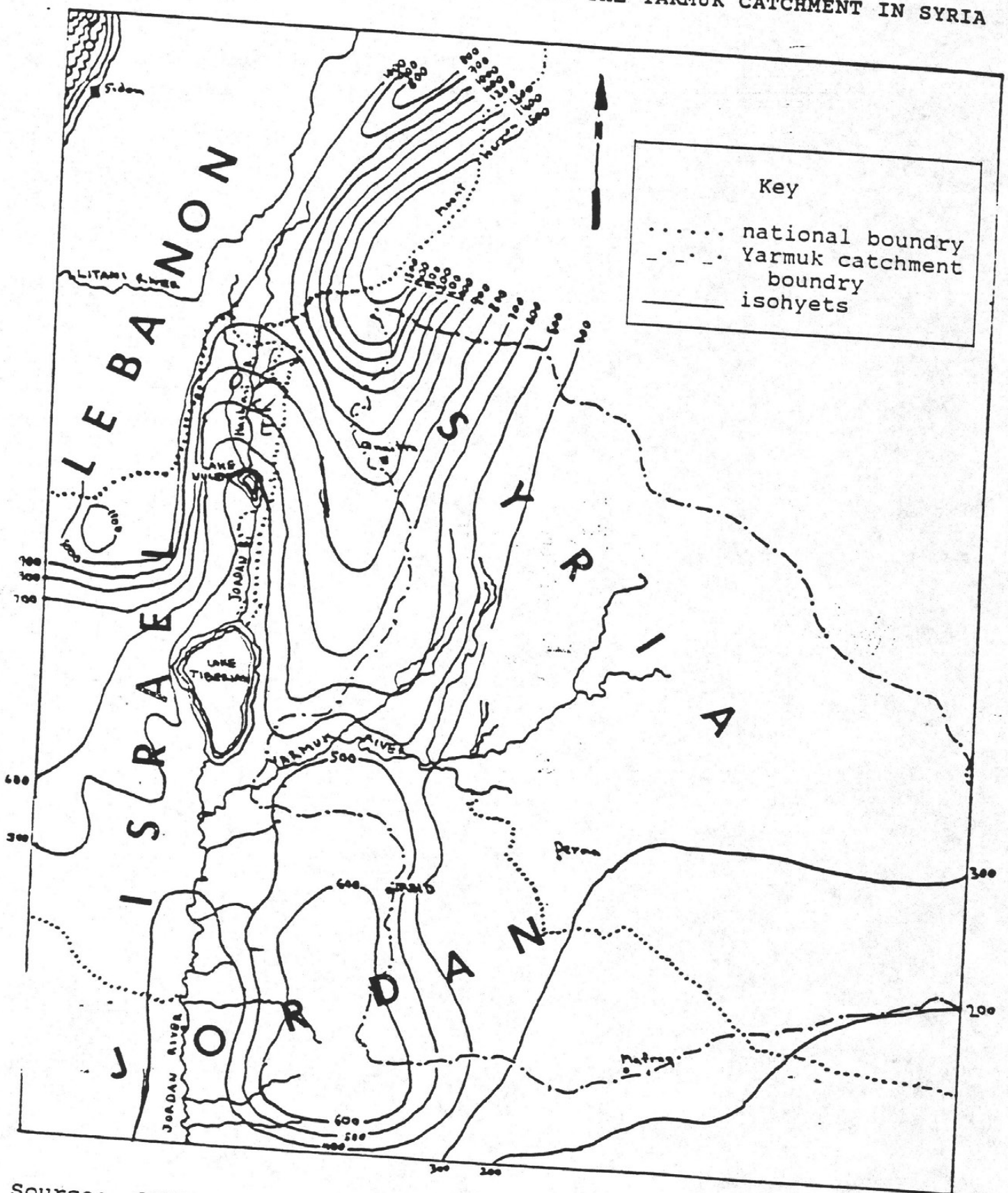
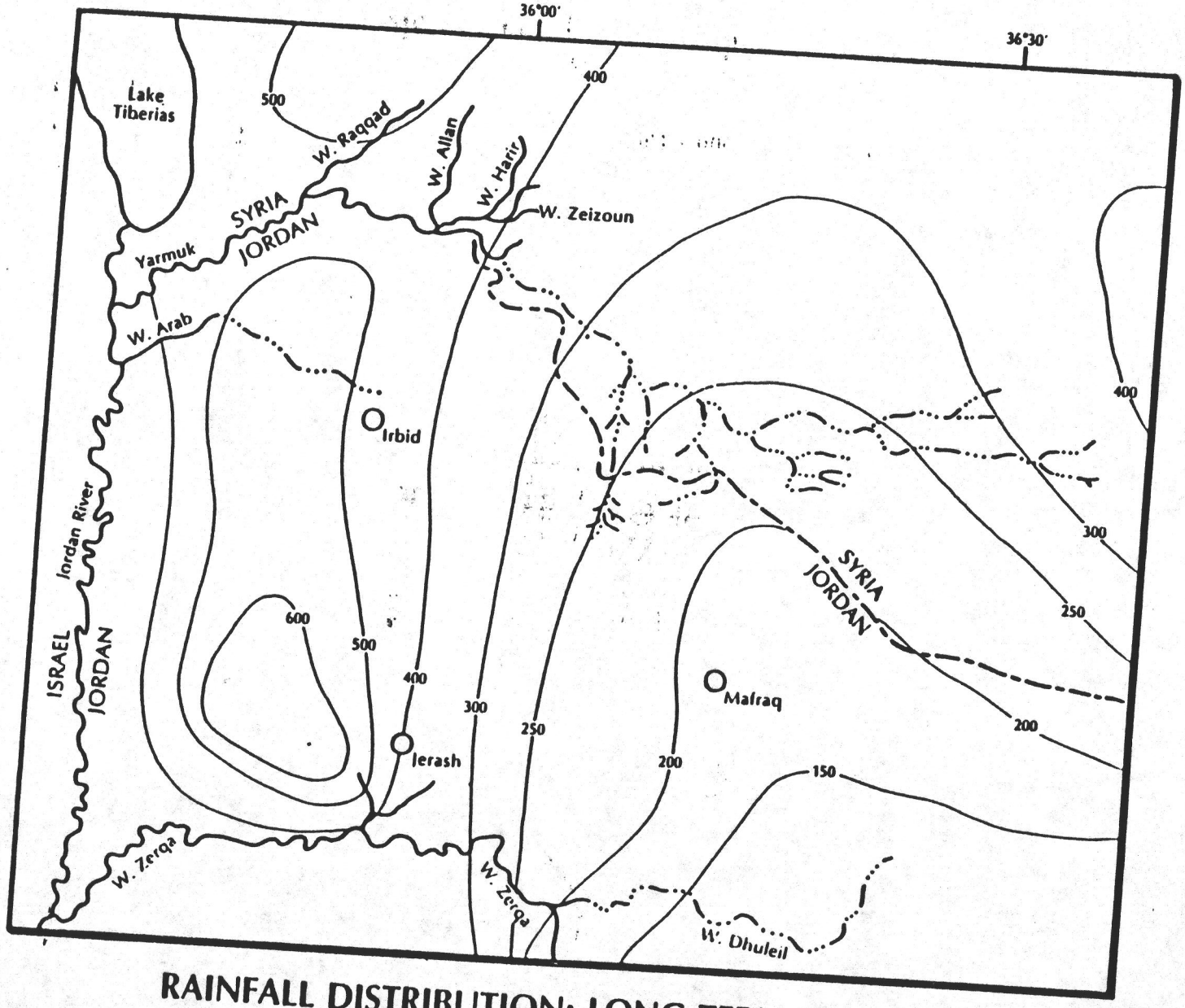


FIG. 1.1
JORDAN RIVER SYSTEM
major tributaries and drainage basins
international boundary
armistice line
NORTH
HASBAYA SPRINGS
WAZZANI
HASBANI
HERMON SPRINGS
LEBANON
DAN
BANIAS
NATIONAL WATER CARRIER
YARMUK
Haifa
Sea of Galilee
Kinneret
Lake Tiberias
ARAB
ZIQLAB
SYRIA
JURUM
YABIS
JORDAN
KUFRINJA
Mediterranean Sea
RAJIB
ZERQA
FARIA
Tel Aviv
WADI AUJA
JORDAN
SHUEIB
WADI QILT
KUFREIN
Jerusalem
HISBAN
Dead Sea
WADI ZERQA MAIN
Gaza
WALLA
MUJIB
Beersheba
ISRAEL
ARABA
EGYPT
ISRAEL
WADI EL HASA
ARABA
EGYPT
JORDAN

Fig. 1.2a RAINFALL DISTRIBUTION FOR THE YARMUK CATCHMENT IN SYRIA



Source: AMER, *Yarmuk Field Data*(3056), pp. 3-6.



RAINFALL DISTRIBUTION: LONG TERM AVERAGE 1930-1977

Fig. 1.2b: Yarmuk basin in Jordan; long-term average rainfall.

1.2. Defining the Conceptual and Practical Issues of Water

In this section, the issues will be defined essentially in terms of the hydrological parameters and requirements of Jordan as a basis for understanding the intrinsically related political and socio-economic dimensions, which will be elaborated in subsequent chapters.

As river systems go, the Jordan by comparison with other rivers such as the Nile or the Euphrates is not overly complicated. The system consists of several segments, each with a hydrological character markedly different from the others, resulting in the division of the river basin into a number of sub-basins, which in turn are fed by tributaries, side-wadis, and valley floor runoffs, while various ground water systems contribute their own peculiarities (see Fig. 1.3).

1.2.1. The Concept of Scarcity

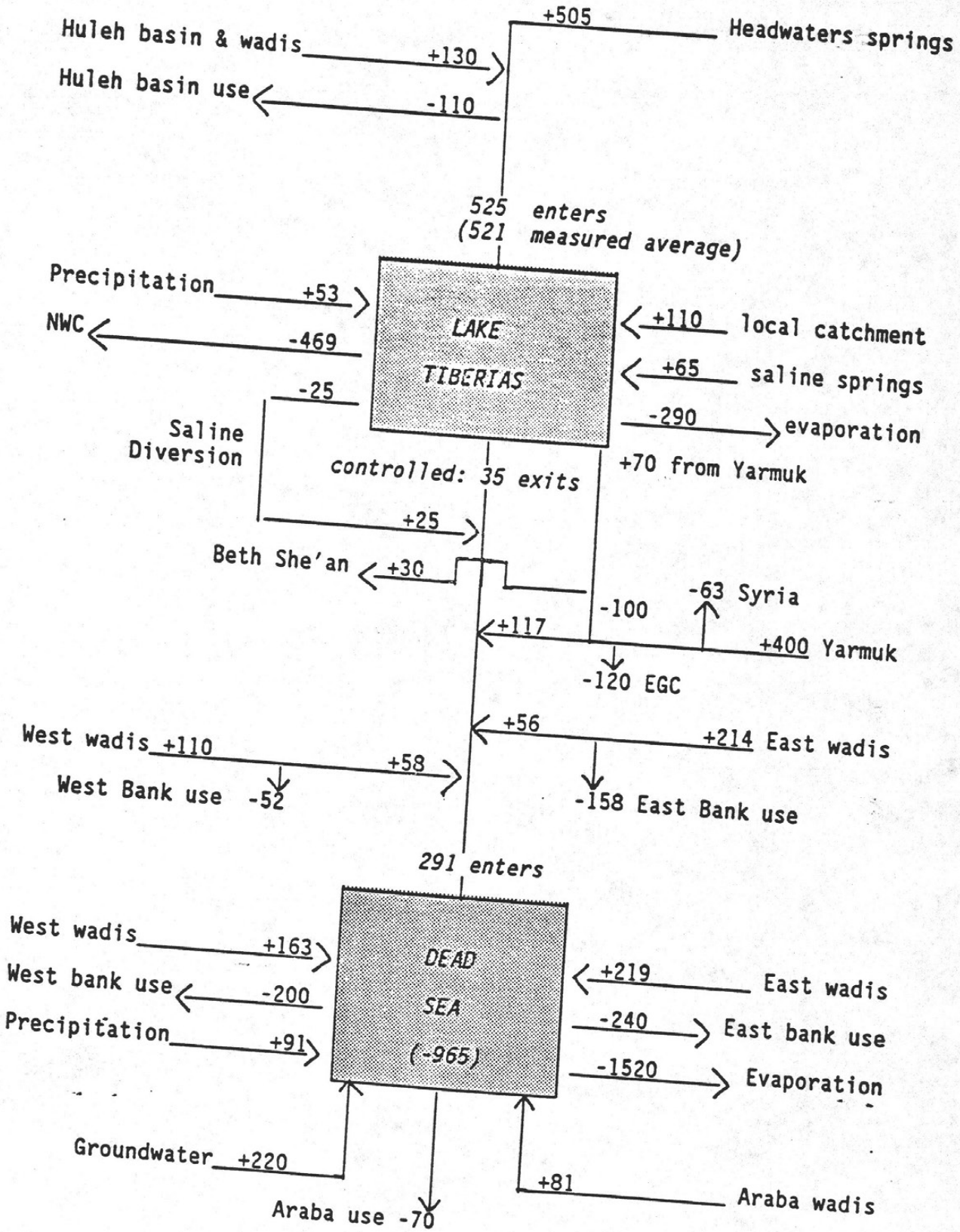
Patently, every Jordanian water issue, current or projected, radiates from the overriding fact of scarcity. In Jordan, the reality and concept of water scarcity are complex in both physical and human terms, and the most serious complications lie in the political and economic dimensions of scarcity. Consequently, the concept of scarcity when applied to Jordanian water problems must be defined and measured in several discrete but inter-related ways: in terms of perceived and real need, consumption, technical capacity, costs, accessibility, demographic trends, distribution, organization and management, loss and waste, climate, and finally, extant and safe-yield stocks of water. These factors are, in turn, integral to the political processes and riparian relationships of the Hashemite Kingdom and its neighbors.

Virtually all of these elements which define the notion of scarcity are manifest, explicitly and implicitly, when the state of Jordan's water supplies and needs are examined. Jordan's water scarcity can be largely demonstrated by straight arithmetical calculation. However, a few prior definitions are in order if the arithmetic is to make sense.

When determining the amount of water available for Jordanians to use, a distinction must be made between extant (or existing) water, which is all surface and ground water known to exist in Jordan, and water that is safe to use (or safe-yield water). Safe-to-use water is water that is actually available for consumption at a rate calculated to safeguard against too rapid depletion over a given time. Too rapid depletion results in degradation of the remaining resources. Overdrafts on current supplies beyond the safe-to-use rate can, if continued long enough, render water sources completely unuseable for future generations. There will by definition always be a discrepancy between extant water and safe-to-use water because, for a variety of geological, geographical and economic reasons, only a certain portion of a total existing stock will actually be extractable and useable. Consequently, when measuring water problems, it is practical to use only safe-yield figures.

Figure 1.3

CURRENT REGIME OF JORDAN RIVER SYSTEM
Water Balance as of 1985 in Mcm/yr



1.2.2. The Perception and Reality of Scarcity

Currently, the total proven stock of surface and ground water in Jordan is 1256 million cubic meters (Mcm). About 9 Mcm of return flows (RF) were reclaimed and reused in 1986 bringing Jordan's total supply of water to 1265 Mcm. Aggregate maximum consumption for agricultural, municipal, and industrial use is 678 Mcm/year (669 from natural stock, 9 Mcm from recycling) leaving a positive balance of 587 Mcm/year(4092).

Table 1.1
SURFACE AND GROUNDWATER IN JORDAN - 1986

Surface water (base and storm flows)*	780 Mcm
Unused	444 Mcm
Used for Agriculture	331 Mcm
Used for M&I**	5 Mcm
Return Flows	9 Mcm
Unused	0 Mcm
Used for Agriculture	9 Mcm
Used for M&I**	0 Mcm
Total Groundwater	476 Mcm
Unused	143 Mcm
Used for Agriculture	178 Mcm
Used for M&I**	155 Mcm
Total Water	1265 Mcm
Unused	587 Mcm
Used for Agriculture	518 Mcm
Used for M&I**	160 Mcm

* This excludes 28 Mcm from Wadi Zerqa and 7 Mcm from Wadi Arab, pumped from ground water upstream which reduces base flow, and 63 Mcm drawn off upstream on the Yarmuk by Syria.

** M&I = municipal and industrial

Sources: World Bank, *Jordan Water Resources Sector Study*, 6/27/88(4092). AMER(4220).

With such an apparently substantial surplus, Jordan would seem not to be afflicted with a serious water deficit. But here both paradox and illusion mask reality. When four other key elements are factored into the calculation, the surplus declines radically. These are:

1) The Qa-Disi aquifer
2) Israeli abstractions from the Yarmuk
3) Unexploited Yarmuk water
4) Other unexploited sources

Qa-Disi. The recently discovered Qa-Disi aquifer in southeast Jordan can provide an estimated annual safe-yield of about 100 Mcm. This is non-renewable fossil water that will last only about a century if pumped at the estimated safe-yield. It is a deep aquifer which must be drilled to a depth of about 750-1000 meters (as the water table lowers, extraction becomes more expensive) and its location requires conveyance of its water some 350 kilometers to the most populated regions of Jordan where need is greatest. These factors make the Qa-Disi aquifer at present (and in the immediate future) too costly for full exploitation. However, the Jordanian government is currently extracting some 23 Mcm/year for the city of Aqaba and for irrigation of grain in the south. Moreover, the Jordanian government is seriously considering treating the Qa-Disi aquifer as a strategic reserve(4092).

Israeli abstractions from the Yarmuk. After completion of Israel's National Water Carrier in 1964, and particularly since acquiring upper riparian status on the Jordan River in 1967, Israel has been diverting all useable water from the Jordan river for its own needs. This effectively denies any use of Jordan river waters to Jordan, the lower riparian. Consequently, Jordan has had to rely on the Yarmuk River for its main supply of surface water. After upstream Syrian extraction, the Yarmuk contains an average annual flow of 337 Mcm (total flow of 400 Mcm minus 63 Mcm for Syria) for potential use by Jordan. However, Israel has been drawing off upwards of 100 Mcm/year for the Yarmuk Triangle*, the Beth Shean plain, and storage in Lake Tiberias(4220). Until and unless an agreement can be reached, any safe planning for Jordan will have to take account of this Israeli usage (Israel has shown itself willing and able to insure this usage by force).

Unexploited Yarmuk water. Although the Yarmuk is manifestly a potential boon to Jordan, that benefit remains largely unfulfilled because the country lacks sufficient storage facilities to capture the Yarmuk's flow. Jordan's government has been acutely aware of this problem and has since the 1950s planned a large dam at Maqarin to solve the storage problem. The original Maqarin scheme has been revised and scaled down and renamed the Unity (Wahda) Dam(3546). The riparian status

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* The land bounded by Lake Tiberias (the Sea of Galilee, Lake Kinnereth), the Jordan River down to its confluence with the Yarmuk, the Yarmuk up to the pre-1967 armistice line with Syria, and the escarpment of the Golan Heights.

of Jordan, Israel and Syria requires the concurrence of Israel and Syria for the construction of the dam. In 1987, Syria and Jordan signed an agreement on water and power allocation which cleared the way for the dam on the Syrian side[3545], but the prospects for an Israeli-Jordanian accord appear dim for the forseeable future.

Consequently, until the Unity Dam is in place, Jordan will be able to utilize only the 125 Mcm per year from the Yarmuk which is currently diverted to the East Ghor Main Canal (EGMC, also called the King Abdullah Canal, or KAC), the principal water carrier in Jordan[4092]. Moreover, even if the Israeli veto were removed, Jordan lacks the necessary capital, estimated at $340 million (private communication, 1988) for building the dam.

These three elements -- the Qa-Disi aquifer (77 Mcm), the Israeli abstractions (100 Mcm), and the unexploited Yarmuk water (112 Mcm) represent 289 Mcm out of the total 1256 Mcm stock which is both unexploited and unexploitable under present conditions for financial, technical and geo-political reasons. Thus, for all practical purposes, this 289 Mcm is water that does not exist for use by Jordan and the realistic "total stock" is only 967 Mcm.

Other unexploited sources. These three elements represent almost one-half of all undeveloped water in Jordan. In determining scarcity, the fourth element, i.e. the remaining unexploited water, must be taken into account. Most of the undeveloped balance of surface water resources are either of poor quality, and/or far from population centers. The remaining groundwater resources are either fossil, shared with Syria, of poor quality, distant from population centers, and/or would reduce the base flow of an associated stream if exploited (see Tables 1.2 and 1.3).

The tables reveal that the total amount of undeveloped water in Jordan is 587 Mcm, including 289 Mcm from the Qa-Disi and Yarmuk. Of the 587 Mcm undeveloped total, 196 Mcm are burdened with a combination of problems so severe that the Jordanian authorities consider them unexploitable and have no plans to develop them. Therefore when all of the undeveloped sources (587 Mcm) and total consumption (678 Mcm) and the used return flow (9 Mcm) are subtracted from the total water stock (1259 Mcm), the true surplus is reduced from what appeared to be 587 Mcm to 96 Mcm (see Table 1.4).

Of this 96 Mcm "real surplus", some 68 Mcm are waters suitable only for a single, usually local, use, i.e., agriculture in the Jordan Valley or industry at the Dead Sea. Thus only 28 Mcm constitute a surplus available for multi-purpose development. This amount is trivial in the face of projections for population increase and demand.

For a climatically arid country where the population is increasing at a rate of 3.8% per annum, where irrigated agriculture consumes 76% of available water, and where owing to rapid population growth and other causes the municipal water demand will more than double in the next three decades[4092], a surplus of 96 (or 28) Mcm/year is marginal at best. Even

Table 1.2
JORDAN - PROBLEMS OF UNDEVELOPED WATER (1986)

Source	Amount	Problems*
Groundwater (143 Mcm)		
Mukheiba wells	11 Mcm	F
Wadi Hasa	1 Mcm	f,R,D (W. Hasa)
Disi	19 Mcm	f,D
Qa Disi	77 Mcm	F,S,D**,C (S.A.)
Siwaqa/Qatrana/Sultani	16 Mcm	R,D (W. Mujib)
Rumeil	7 Mcm	f,R (W. Wala)
Wadi Wala	15 Mcm	R (W. Wala)
Wadi Arab	3 Mcm	R (W. Arab)***
Ajlun	16 Mcm	f,Q
El Jafr	18 Mcm	f,Q
Already Overpumped	-40 Mcm	
TOTAL	143 Mcm	
Surface Water (444)		
Yarmuk River	222 Mcm	S,C (SY,IS)
Wadi Mallaha	35 Mcm	---
Wadi Kifranja	6 Mcm	---
Wadi Yabis	6 Mcm	---
Wadi Wala	25 Mcm	---
Wadi Mujib	25 Mcm	Q
Desert Floodwaters	6 Mcm	---
Other	119 Mcm	Q,D
TOTAL	444 Mcm	

F = fossil water; f = partly fossil water: about 115 Mcm of undeveloped groundwater sources (80%) are fossil.

R = reduces base flow of associated stream (stream in parintheses): 20 Mcm of undeveloped groundwater sources (14%) would, if extracted, reduce the base flow of an associated stream, and much of the overpumped groundwater has already reduced the Zarqa River.

Q = poor quality water (for industrial use only): about 120 Mcm of all undeveloped sources (20%) are of this poor quality.

S = shared with another country (country in parentheses): 299 Mcm of all undeveloped sources (51%) are shared with another country.

D = distant source of water: about 160 Mcm of all undeveloped sources (27%) are far from centers of population.

C = extremely high cost to develop (excluding transport costs): 299 Mcm of all undeveloped sources (51%) will be very expensive to develop.

* Only 78 Mcm of all undeveloped sources (13%) have none of the above problems. All of this is surface water, most of it planned for irrigation, and will thus be of little benefit to the municipal demand.

** The water from Qa Disi used to supply Aqaba will not have this problem.

*** In 1987, the remaining 3 Mcm was pumped, as were an additional 9 Mcm. This overpumping reduced the flow of the Wadi Arab by 80%.

Source: World Bank(4092).

Table 1.3
JORDAN - UNDEVELOPED WATER (1986)*

Groundwater (143 Mcm)

PLANNED:		(completed by)	UNPLANNED:	
Wadi Wala wells	15 Mcm	(1990)	El Jafr	18 Mcm
Mukheiba wells	11 Mcm	(1995)	Ajlun	16 Mcm
Disi	19 Mcm	(1995)	Wadi Arab	3 Mcm
Wadi Hasa	1 Mcm	(1995)	Overpumped	-40 Mcm
Siwaqa/Qatrana/Sultani	16 Mcm	(2005)		-3 Mcm
Rumeil	7 Mcm	(2005)		
Qa Disi	77 Mcm	(2010)		
TOTAL	146 Mcm			

146 Mcm [planned] + (-3) Mcm [unplanned] = 143 Mcm undeveloped groundwater.

Surface Water (444 Mcm)

PLANNED:		(completed by)	UNPLANNED:	
Yarmuk River	81 Mcm	(1995)	Yarmuk River	141 Mcm
Wadi Yabis	6 Mcm	(1995)	Other	119 Mcm
Wadi Kifranja	6 Mcm	(1995)	(Other consists partly of desert	
Desert Floodwaters	6 Mcm	(1995)	floodwaters, and partly of poor	
Wadi Mallaha	35 Mcm	(2000)	quality water, or floodwaters,	
Wadi Mujib	25 Mcm	(2005)	in the Dead Sea and Wadi Araba	
Wadi Wala	25 Mcm	(2005)	areas.)	
TOTAL	184 Mcm		TOTAL	260 Mcm

184 Mcm [planned] + 260 Mcm [unplanned] = 444 Mcm undeveloped surface water.

Total Undeveloped Water (587 Mcm)

PLANNED:		UNPLANNED:	
Groundwater	146 Mcm	Groundwater	-3 Mcm
Surface water	184 Mcm	Surface water	260 Mcm
TOTAL	330 Mcm	TOTAL	257 Mcm

330 Mcm [planned] + 257 Mcm [unplanned] = 587 Mcm total undeveloped water.
444 Mcm [surface water] + 143 Mcm [groundwater] = 587 Mcm total undeveloped water.
1256 Mcm [total water supply] - 669 Mcm [current water use] = 587 Mcm total undeveloped water.

* Return flow excluded from all calculations.

Source: World Bank(4092).

if that figure were doubled it would still be insufficient. Nonetheless, if there is a surplus of whatever order, it is reasonable to ask whether Jordan is in a genuine water quandary.

Table 1.4
WATER SURPLUS OF JORDAN

Total undeveloped water	581 Mcm
Yarmuk / Qa-Disi	289 Mcm
Undevelopable	196 Mcm
TOTAL SURPLUS	96 Mcm

The answer, which is emphatically yes, lies in the variance between extant water and safe-use water within Jordan's borders. It is this difference that creates both the illusion of surplus and the paradox of a society that is becoming parched in a country where there is, on paper, a significant quantity of unused water. In reality, Jordan is presently in a condition of water deficit, overpumping at the rate of 110% of developed supply (see Fig. 1.4, p. 17). Significant numbers of urban and rural Jordanians suffer chronically from water scarcity, and Jordan is confronted with a continuing water debit along with a shrinking tolerance for shortages from whatever cause.

The Jordan Valley offers an excellent illustration of the reality of water scarcity as opposed to a hypothetical arithmetical surplus. In the Jordan Valley, some 22,800 hectares of land are presently irrigated, and an additional 6,000 hectares have been developed for irrigation, but owing to water shortage cannot be irrigated. Current croping patterns of fruits and vegetables require 367 Mcm/year to irrigate all the land that has been developed, but in 1986 only 299 Mcm was actually available for delivery. Because of projected shortages and other noted problems, 346 Mcm is the maximum average annual quantity of water that is likely to be available down to the year 2005 (assuming Unity Dam is not built). But this volume represents a shortfall even of current demand[4092].

1.2.3. The Real Deficit

The real water deficit can be explained by the factors that define safe-yield water as opposed to extant water.

1) Accessibility/Extractability. All of Jordan's available hydrological stock is now being extracted and exploited within Jordan's technological and economic capacity to do so. Owing to the 3.8% population growth rate, that accessible supply is too meager for present, not to mention projected, needs. Consequently, serious overdrafts are occurring from some important sources. The Amman/Zarqa boreholes are being overdrawn by 38%/yr (12 Mcm)[4092]. As early as 1980, the water in

the wells in the Amman area was already polluted(1423), and this trend of overuse, if not reversed, could destroy one of Amman's cheapest and closest water sources.

There are only three significant under- or unexploited sources of water in Jordan: the Yarmuk river, the Qa-Disi aquifer, and the southern wadis. Utilization of these resources requires major capital investment for construction and conveyance facilities in all cases. Except for the Yarmuk, these sources are located far from population centers where water is most needed. The Qa-Disi aquifer exhibits problems of depth, distance, and cost, and constitutes a reserve of fossil water of finite quantity. Qa-Disi has the added international complication that it is shared with Saudi Arabia, as the Yarmuk is shared with Syria and Israel.

2) Affordability. The last hypothetically cheap water available to Jordan is the Yarmuk river. Cheap, that is, in terms of quantity, location, and exploitability. But full exploitation requires building the Unity (Wahda/Maqarin) Dam complex. Unfortunately -- even leaving aside the political problem of Israeli approval -- the difficult topographical and geological features of the river valley make construction costs of adequate storage facilities very high, even by the cost standards of water scarce countries(4092). Although the Unity Dam is essential for full utilization of the Yarmuk, and Jordan is determined to build it, it is worth reiterating that the estimated $340 million price tag is beyond Jordan's capacity to pay. Thus, the Yarmuk is affordable water only if the capital costs are removed from the calculation. Such funds must come from regional and international sources.

3) Quality. The quality of Jordanian water stocks is mixed. Important sources such as the Yarmuk river, the eastern riftside wadis, and the Qa-Disi aquifer are generally good, while the small residue in the main stream of the Jordan river is usually unusable and some of the springs east and south of the Dead Sea are brackish(4220). A growing problem is pollution of waters feeding the larger municipalities. Because of inadequate government regulation and enforcement of antipollution rules for industry, this problem has become acute. In 1987, in order to relieve water shortages in Amman, water from the King Talal Dam reservoir was pumped to Amman by way of the EGMC. However, the water was so contaminated that the purification facility was unable to remove many of the pollutants, causing numerous instances of illness, some serious. This incident led to the creation of the new Ministry of Water and Irrigation(3407). The problem of impure water increases Jordan's difficulties by requiring the construction of expensive treatment facilities before significant water resources can be used. But Jordan presently lacks the money to build all of the purification plants it needs.

4) Conveyance/Distribution. As indicated, most of Jordan's known water resources that are unused are located in southern Jordan, away from the areas where water is most needed. Even if problems of extraction and quality are overcome, the essential network for delivering water over long distances is virtually non-existant, and will be costly to construct. The consequence is a critical situation of maldistribution of

water resources. For example, in 1983 the total quantity of water delivered to farmers in Jordan was 40% less than cropping patterns demanded, although there was water available. In 1986, a drought year, the situation was far worse(4092).

Moreover, a growing proportion of the useable agricultural water will consist of return flows from reclaimed sewage; these are projected to increase from 9 Mcm in 1986 to about 100 Mcm in 2015, accounting for one-third of Valley irrigation water in the latter year(4092). If the amount of water available to the Jordan Valley does remain static, and if the increasing demand for municipal and industrial water (a 200% increase by 2015(4092)) is factored into current and future shortages of irrigation water, it becomes apparent that further expansion of agriculture in Jordan must be curtailed. Since agricultural self-sufficiency is the basis of Jordan's food security policy(3929), and since agriculture accounts for 19% of Jordan's exports, curtailment will adversely affect the government's development and security plans. This has impact on Jordan's domestic and foreign politics.

1.3. Supply and Demand

The foregoing picture of scarcity painted against a background of extant water is also reflected in the following table of Jordan's water supply, 1975-1985, which contrasts projected and actual supplies (see Table 1.5).

The obvious pattern which emerges from these numbers and percentiles spread over the decade is that of consumption increasingly suppressed by supply constraints in the face of rising need. In 1975, Jordanian authorities projected that by 1985 the average municipal consumption would be 100 liters per capita per day (l/c/d). In fact, consumption, repressed by water shortage, reached an average of only 81-83 l/c/d, which is also the current rate. The current figure of 81-83 l/c/d is low when compared with other countries in the region with lower per capita incomes. For example, Turkey consumes an average of 85 l/c/d and Morocco 110 l/c/d(4092). The amount of land irrigated in 1985 was 15,000 ha lower than projected, largely due to lack of available water. Consumption in Jordan is apparently already suppressed by supply constraints. This condition, if continued, is likely to produce serious political and economic tension in Jordan over the next decade.

Compounding all of the foregoing factors that account for water scarcity are the continuous vexing problems of loss, waste, and mismanagement which contribute to absolute shortage. A few figures illustrate the point. Of the water delivered to the Jordan Valley in 1985, an aggregate 51% was lost, roughly 30% during conveyance through the EGMC, and 30% of the residue during on-farm use. World Bank experts estimate that by repairing the EGMC and installing drip irrigation, losses could be reduced to 15% during conveyance and 22% on-farm -- an aggregate total of 34% and a marked gain(4092). Of the water delivered to

municipalities an estimated 20% is lost through leakage, and only 51% of municipal water produced is actually billed (i.e. paid for)[4092]. Structural weaknesses in the overall administration of water together with a scarcity of certain kinds of managerial expertise have accounted for most of the mismanagement in Jordan's water establishment. The newly created Water and Irrigation Ministry should lead to improvement.

The tableau of current and projected need down to the end of the century indicates that the disparity between supply and need will widen if the population growth rate continues on its present trajectory and Jordan's water stocks are not somehow increased commensurately (see Table 1.6 and Fig. 1.4).

These are meaningful statistics with inherently portentious political and economic implications for Jordan. The population will increase by 176% between 1986 and 2015, from 2.7 million to 7.5 million. The water needs of municipalities, where the vast majority of Jordanians already live, will more than double in the same years, from 161 Mcm/yr to 348 Mcm/yr (a 115% increase). Industrial demands crucial to Jordan's economic development will quadruple from 28 Mcm/yr to 118 Mcm/yr (321%). However, Jordan's extant water supply will remain about the same (with slight increases due to return flow development), i.e., 1268 Mcm. Taking into account the variables of accessible water, technological capacity, financial resources, and distribution, the total stock of Jordan's useable water supply will be hard pressed to keep up with accelerating demand.

In the best-case scenario (assuming Unity Dam is completed on time) Jordan would be able to keep abreast of demand until sometime between the years 2015 and 2020, and then demand outpaces supply (unless major new sources of water come on line). Without Unity Dam, a much more likely short-term scenario, various repairs, increased efficiency and subsequent decreased water loss would enable Jordanian water supply to approach demand in 1995, but it would then diverge, falling far below it by 2020, as demand continues to accelerate.

The political and economic implications of these facts are immense. In the short term, without major improvements in the situation, Jordan will suffer dangerous depletion and degradation of its water stocks, which will reduce the useable supply and degrade the reserve, thereby making the problem more acute. The consequence would be constraints on economic development in both agriculture and industry, the rationing of water to the public, strict enforcement of regulations, and heightened domestic tension.

Moreover, even if one assumes all planned projects are completed on schedule, demand will still outstrip supply before 2020. If Unity is not constructed, this would occur in earnest from 1995 onward. Jordan will then have to turn to the remainder of its resources not currently slated for development. But most of this water is either shared with another riparian, requiring political agreement, or of very poor quality, entailing expensive desalination for all but certain industrial uses. If developing these last remaining resources proves impossible, Jordan's

Table 1.5
JORDAN WATER SUPPLY 1975-1985

	1975	1985 (proj)	1985 (actual)
Agricultural Water			
Irrigated Area (ha)	33,600	58,300	48,528
Groundwater (Mcm)	102	198	178
Surface Water (Mcm)	303	532	340
Total Water (Mcm)	405	730	518
Water Required (Mcm)*	265	461	383
Allowable Water Loss (Mcm)/(%)	140/34%	269/37%	135/26%
Actual Water Loss (Mcm)/(%)	---	---	225/43%

* For planning purposes, the Jordan Valley Authority (JVA) sets crop water requirements at 7885 cubic meters per ha. Losses in 1985 in the Jordan Valley (JV) were 30% in the conveyance system and 30% on farm, totaling 51%. The World Bank estimates that by repairing the EGMC and installing drip irrigation, losses could be brought down to 15% and 22% respectively, still almost 34%. It is assumed here that losses outside the JV are already 34%, and that countrywide water requirements are the same as for the JV, 7885 cubic meters per ha.

Municipal Water			
Population ('000)	1,880	2,743	2,694
Population Served ('000)	1,550	---	2,586
% Population Served	82%	---	96%
Domestic Use (Mcm)/(l/c/d)**	28.7/40	100.5/100	76.8/81
Non-Domestic Use (Mcm)	11.7	11.5	15.8
Losses (Mcm)/(%)	---	28/20%	23.2/20%
Total Production (Mcm)	45.7	140	115.8
% Billed	50-65%	---	51%

** In 1975, 4.3 Mcm was produced for domestic use by those not supplied by a municipal network. Their average consumption was 35 l/c/d.

Industrial Water			
Industrial Water Use (Mcm)	7.9	55	28
Total Water			
Total Water Produced (Mcm)***	458.6	925	670

*** The Five Year Plan for 1986-1990 gives 1985 figures of 409 Mcm for agricultural water, and 111 for municipal and industrial water, for a total of 520 Mcm.

Sources: World Bank(4092).
Jordan - Ministry of Planning, *Five Year Plan for Economic and Social Development 1986-1990*, 1986(3801).
Jordan - Natural Resources Authority, *National Water Master Plan of Jordan*, v. 5-6, 1977(2820)(3094).

Table 1.6
JORDAN WATER SUPPLY AND DEMAND TO THE YEAR 2015*

	1986	1990	1995	2000	2005	2010	2015
JV Agriculture							
cu m/ha	7885	7885	7885	7885	7885	7885	7885
losses (%)	(51%)	(51%)	(34%)	(34%)	(34%)	(34%)	(34%)
ha irr.	22,828	28,802	28,802	28,802	28,802	28,802	28,802
Demand	367	463	344	344	344	344	344
Available	284	261	315 [273]	350 [308]	350 [308]	350 [308]	350 [308]
*Non-JV Agriculture***							
cu m/ha	7885	7885	7885	7885	7885	7885	7885
losses (%)	(34%)	(34%)	(34%)	(34%)	(34%)	(34%)	(34%)
ha irr.	25,700	25,700	25,700	25,700	25,700	25,700	25,700
Demand	307	307	307	307	307	307	307
Available	234	234	220	220	220	206	206
Total Agriculture							
Demand	674	770	651	651	651	651	651
Available	518	495	535 [493]	570 [528]	570 [528]	556 [514]	556 [514]
Municipal & Industrial							
(l/c/d)	123	127	128	128	128	128	128
Population	2.693	3.246	3.865	4.591	5.441	6.373	7.451
Mun. Demand	132	151	181	214	254	298	348
Ind. Demand	28	37	54	71	87	94	101
M&I Demand	160	188	235	285	341	392	449
M&I Available	160	198	324 [243]	338 [257]	401 [320]	506 [425]	519 [438]
Total Demand	*834*	*958*	*886*	*936*	*992*	*1043*	*1100*
Total Available	*678*	*693*	*859 [736]*	*908 [785]*	*971 [848]*	*1062 [939]*	*1075 [952]*
Total Supply	*1256*	*1256*	*1256*	*1256*	*1256*	*1256*	*1256*
(RF)	*(9)*	*(9)*	*(51) [9]*	*(65) [23]*	*(78) [36]*	*(92) [50]*	*(105) [63]*

* assumes further agricultural development is halted immediately, and the water replaced by return flow developed after Unity will be diverted for M&I uses. Also assumes no reduction in current groundwater overpumping. JV requirements for the planned 36,000 ha would be 430 Mcm. Requirements for the planned 20,000 ha in the South would be another 240 Mcm. Numbers in brackets denote amount without Unity.

** non-JV agriculture includes 4,700 ha in the South Ghors, 18,000 ha upland, and 3,000 ha in the South.

Source: World Bank(4092).

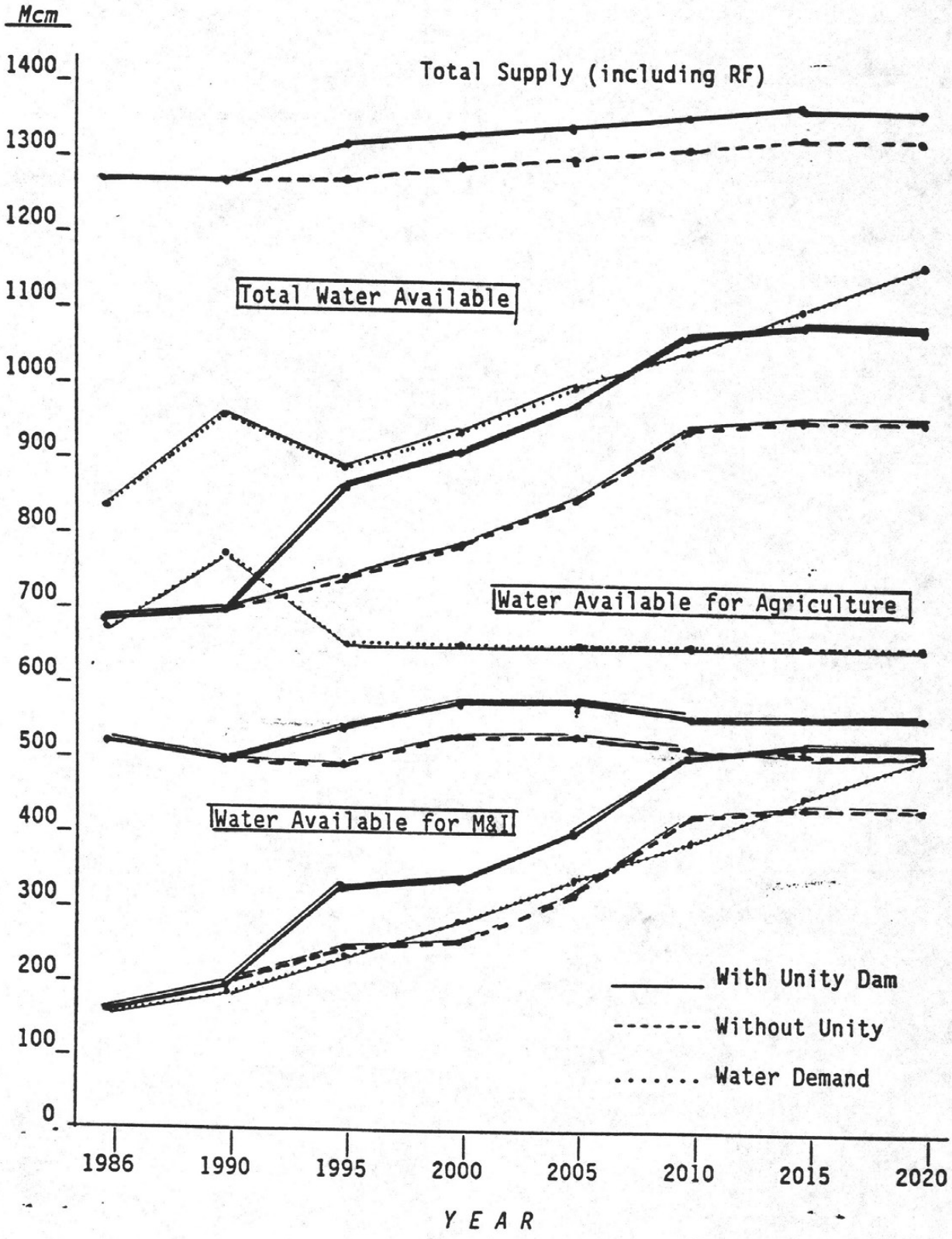

Fig. 1.4 - Jordan Water Supply and Demand to the Year 2020.

additional water demands will have to be provided from outside the country, possibly by pumping from the Euphrates in Iraq (160 Mcm has been suggested(4180)), or from Turkey via the so-called "peace pipeline" which is currently being studied (219 Mcm(3928)). But these projects, too, would be extremely costly and would require solution or mitigation of all outstanding major issues among the riparians involved -- Turkey, Syria, Israel, Jordan, and Iraq. Such a prospect in the short term appears bleak.

1.4. Demographic Trends and Water Issues

In every country, water shortage or abundance is always correlative with population. In Jordan, if scarcity is the salient factor in water issues, then it is the country's demographic pattern that determines that saliency and configures scarcity. But, like the concept of scarcity, the demographics of Jordan are also a complex matter as they relate to water. This is because other important influences, specifically, geography and climate, which are cognates of water issues, significantly affect settlement patterns, water needs, and the general quality of life. These tangibles frame the hydrological demography of Jordan.

The pattern of Jordan's population settlement has been heavily influenced by the factors of terrain, climate, and water availability. The total population is estimated to be 2.7 million persons, growing at a rate of 3.8% per annum. Ninety-one percent of the people live in the north Jordan uplands and Jordan Valley, where water is most available. One half of the total population is concentrated in the four cities of Amman, Zerqa, Ruseifa, and Irbid. Aqaba, the industrial and port city in the south with a current population of 38,000, is growing at a rate of 8% per year(4092). The present spatial distribution of population, with the possible exception of Aqaba, will probably continue (see Fig. 1.5).

Urban population has accounted for the most rapid growth in Jordan over the last three decades. The proportion of people living in settlements of over 5,000 (the threshhold by which the Jordanian government distinguishes urban from rural) increased from 37% in 1952 to 51% in 1961 to 70% in 1979 (last census). The majority of rural dwellers live in villages within relatively easy access of cities. Moreover, despite overall scarcity of water and the necessity of conveying water long distances, the rural population of Jordan has been increasingly supplied with piped water from public sources. In 1985, 86% of rural dwellers were served by some form of public water system. Given the rapidly expanding needs of M&I and the stiff competition for water between M&I and agriculture, the water-related problems of population distribution and rapid urban growth have significant implications for domestic politics.

In the light of Jordan's relatively advanced level of education and per capita income ($1,560/yr), the 3.8% population growth rate is very high. Government agencies have concluded that the increased growth, real

need, and heightened expectations generated by rapid economic rate of expansion of the last five years will decline only slowly over the next two decades. The estimated total increase to 3.3 million in 1990 and to 5.4 million in 2005 foretells serious problems in water consumption. Some of those problems are already manifest in relation to population growth, real need, and heightened expectations generated by rapid economic development and higher incomes. The latter has motivated Jordanians to strive for better housing and amenities, and many of those Jordanians who added to their incomes by working in the Gulf used their capital to construct quality housing which has led to higher water demand.

Table 1.7
POPULATION OF JORDAN (000)

Governate	1961	1979	1985	2005	2015
Amman/Zarqa	434	1186	1504	3379	4631
Irbid/Mafraq	274	609	752	1324	1815
Balqa	79	152	187	269	364
Karak/Tafila	67	126	156	268	367
Ma'an	47	75	94	201	274
TOTAL	901	2148	2693	5441	7451
% Urban	51%	70%	70%	70%	70%
Population Growth Rate (% per annum)		4.9%	3.8%	3.5%	3.2%

Source: World Bank(4092).

1.5. Current and Emerging Issues

With some of the conceptual and practical difficulties integral to defining Jordan's water issues exposed, and with scarcity as the established premise, it is now possible to list the most critical current and emerging water problems, all of which have already been touched upon and which are inter-related.

Current Issues:

1) Poor capacity to augment and salvage present stocks of useable water.

2) High cost of water in terms of construction of storage, purification, and conveyance facilities.

3) Rapid population growth in relation to limited water supply.

4) Difficulties of allocation of water between agriculture and M&I without more adequate data and effective studies.

5) Planning of water policies and projects without sufficient manpower in relevant fields of expertise, and a concomitant overdependence on foreign consultants.

6) Poor management and implementation in several areas because of inefficient organization of overall water administration and overlapping responsibilities and authorities.

7) Water security issues exacerbated by the sharing of the Jordan River system by four mutually hostile riparians, with Jordan distinctly unequal in power to its main adversary, Israel, but requiring Israeli approval for certain critical water solutions.

Emerging Issues:

1) Maldistribution, owing to the lack of an effective conveyance system between the sources of water and the main areas of need.

2) The repair and upgrading of current facilities and the development of new ones so as to improve water efficiencies and quality, reduce costs, and increase availability.

3) Reduction of the rate of population growth to reduce the increase in demand.

4) Need to increase manpower expertise across the entire water sector. This does not require a large increment in manpower, rather an upgrading and appropriate distribution of skills.

5) Need to improve planning and management and develop an integrated flexible model for surface and ground water which will illustrate the implications of various water development options and have the flexibility for being updated[4092].

6) Need to develop new resources through technology.

1.6. Conclusion

It is not an uncommon practice to explain water issues by drawing analogies from the world of finance, using such terms as credit, debit, and balance. But the analogy is a frail one. In the realm of water,

overdrafts on current supplies constitute borrowing from the finite stocks of future generations in an absolute sense that does not exist in the sphere of finance. Much of the excess water consumed now can never be replaced in the future. Further, the threat of water degradation means that not only does depletion reduce the absolute value of reserves and their future rate of return, but it may actually destroy the utility of the remaining capital stocks of water. Nor will water technology now or in the foreseeable future have the capacity to generate new useable water in needed quantities at an affordable cost[4204]. Borrowing from future generations is not a sustainable policy. Barring the solution of some of these problems, Jordan will find its social and economic development curtailed by serious sectoral competition for scarce water resources, with significant frustration of the aspirations of its people.

In the long term, and possibly even in the short term, unless Jordan brings its projected population growth under control and at the same time increases its water supply, the country's economic base will not be able to support the population, which will become, so to speak, increasingly thirsty.

While such grim events are neither imminent nor necessarily inexorable, they do even now loom on the horizon. These possibilities will be underestimated or ignored only at grave peril.

Chapter 2
ROLE OF WATER IN JORDAN'S ECONOMY

Jordanian authorities consider Jordan's water resources to be a vital factor in the nation's socio-economic growth and general well-being. They clearly recognize that national progress will depend on the government's ability to develop water resources that keep pace with economic growth and population expansion. Therefore, improvement of the water sector is given priority treatment in Jordan's current Five Year Plan for Economic and Social Development 1986-1990[3801]. With the exception of an allocation for the Unity Dam, a highly problematic scheme, the special attention accorded water in the Plan on the whole appertains mainly to such matters as organization and administration, which indeed are important issues requiring improvement. But the question arises whether sufficient investments are allocated to such critical issues as water conserving technologies in agriculture, improving on-farm efficiencies, water conveyance, and hydrological infrastructure projects to meet Jordan's current needs. Further, the same question applies even more urgently to investing resources toward reversing the high population growth trends.

The rate of performance in the present Five Year Plan must improve significantly over that of the 1981-1985 Plan if Jordan is to avoid the crises implicit in its current and emerging water related problems. A comparison of the previous and current plans reveals that Jordan has experienced difficulty in attaining its intended goals in regard to water investments. Although performance in the second Five Year Plan fell short by about 25 percent (after removing the Maqarin Dam allocation), because the economy is in decline and water shortages have increased, a better achievement of current plan targets is essential.

Table 2.1
WATER SECTOR INVESTMENTS
1981-85 AND 1986-90 PLANS
(in JD millions)

	1981-85		1986-90
	Planned	Actual	Planned
Irrigation and Dams	276	72	117
Water Resources	113	79	12
Water Networks (conveyance)	56	35	63
Wastewater Networks	77	60	88
TOTAL	522	246	280
% of total public investment	29%	9.8%	16%

Source: World Bank[4092].

Table 2.2
INVESTMENTS IN SECTORS
1981-85 FIVE YEAR PLAN

Sector	Investments (JD billion)	Relative Importance
1. Agriculture & Cooperatives	234.5	7.11%
2. Water & Irrigation	521.7	15.81
3. Mining & Industry	758.8	22.99
4. Energy & Electricity	163.4	4.95
5. Tourism & Antiquities	65.7	1.99
Total: Commodity Production and Tourism Sectors	**1744.1**	**52.85**
6. Business & Finance	37.0	1.12
7. Transport	545.5	16.53
8. Communications	106.8	3.24
9. Culture & Youth	9.8	0.30
10. Media	7.9	0.24
11. Education	226.3	6.86
12. Health	100.7	3.05
13. Social Development	15.2	0.46
14. Labor Force	9.2	0.28
15. Housing & Government Buildings	308.1	9.34
16. Municipal, Village and Environmental Affairs	175.6	5.32
17. Religious Endowments	6.4	0.19
18. Science, Technology, and Statistics	7.4	0.22
Total: Service Sectors	**1555.9**	**47.15**
Total Investments	**3300.0**	**100.00**

Source: *Al-Nashrah Al-Iqtisadiyah Al-'Arabiyah*, Nov 82 (2068).

Economically, Jordan tries to make the most out of limited resources and markets. The overall condition of Jordan's economy, while not disastrous, evinces marked frailties. Among the more serious difficulties are small foreign exchange reserves, government budget deficit, the mounting Iraqi debt, losses by major government enterprises, the high cost of living, and unemployment. But there are countervailing positive forces as well. The Jordanian government is politically stable and is making a vigorous effort to stimulate the economy, the private sector is energetic and ambitious to enhance its regional role, the workforce is well educated, strongly motivated, and able to adapt to changing conditions, and labor costs are declining, thus improving Jordan's competitive position. But all of these positive factors are

fragile and susceptible to ambient domestic and regional fluctuations[4111]. These circumstances confront the governing authorities with both opportunities and challenges but with little margin for error (see Table 2.4).

2.1. Population and Manpower

In one way or another, water issues crosscut virtually all of the key sectors of Jordan's economy. But the basic component which forms the backdrop against which the role of water in the economy can be more clearly understood is the demographic structure of the country, particularly those aspects that concern the labor force, distribution of population, and water consumption per capita. This demographic structure forms the context within which water impacts on the economy.

The East Bank population numbers some 2.7 million, and is a significantly youthful population. The proportion under 15 years of age is 50%, 46% fall within the 16-59 year old bracket, and 4% are over 59 years old. The male to female ratio is 105%. Internal migration during the last two decades has resulted in a population distribution that is 70% urban, three quarters of which is clustered in the Amman-Zerqa urban belt. There is every indication that this trend will continue; consequently over three quarters of all Jordanians will be city dwellers by the turn of the century, with a concomitant effect on water consumption, distribution, and quality[3843][3879][0288].

Table 2.3
EAST BANK POPULATION BY GOVERNORATE AND SEX
(1961,1979 and 1985)

Governate/ Year	Amman	Irbid	Balqa	Karak	Ma'an	Total
1961						
Male	230,762	137,524	40,277	34,680	26,164	469,407
Female	202,856	136,452	38,780	32,531	20,750	431,369
TOTAL	433,618	273,976	79,057	67,211	46,914	900,376
1979						
Male	596,793	307,043	75,699	65,108	41,948	1,086,591
Female	555,146	295,171	70,707	59,944	32,460	1,013,428
TOTAL	1,151,939	602,214	146,406	125,052	74,408	2,100,019
1985						
Male	788,825	369,850	93,121	77,659	52,180	1,381,635
Female	733,777	355,550	86,797	91,499	40,377	1,288,182
TOTAL	1,522,602	725,400	180,100	149,158	92,557	2,669,817

Source: Jordan - Ministry of Planning[3825].

Table 2.4
JORDAN -- ECONOMIC DATA

	1980	1981	1982	1983	1984	1985	1986	1987
GNP (JD mn)	--	--	--	1769	1854	1849	1917	--
GDP (JD mn)	980[2]	1166[2]	1321[2]	1422	1499	1573	1613	--
GNP Growth (%)	--	--	--	0.6%	1.6%	3.4%	3.7%	--
GDP Growth (%)	17.1%[2]	10.5%[2]	6.1%[2]	2.6%	2.2%	1.8%	2.6%	2.0%[3]
Inflation (%)	11.1%[2]	7.7%[2]	7.4%[2]	5.0%[2]	3.9%[2]	3.5%	3.0%	--
Population (mn)	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9
Unemployment (%)	--	--	6.7%[1]	--	--	6.0%	8.0%	9.0%
Imports (JD mn)	716[2]	1047[2]	1142[2]	1103	1071	1074	852	916[4]
Exports (including re-exports) (JD mn)	171[2]	243[2]	264[2]	211	291	311	256	317[4]
Trade Deficit (JD mn)	544[2]	805[2]	877[2]	893	781	764	594	599[4]
Aid (JD mn)	399[1]	431[1]	373[1]	296	279	316	238	200[4]
Remittances (JD mn)	237[5]	341[5]	382[5]	403	475	403	414	319[4]
Account Balance (JD mn)	112[2]	-13[2]	-117[2]	-141	-104	-100	-16	-119[4]
External Debt (JD mn)	377[2]	489[2]	593[2]	871	1027	1133	1199	1224
Reserves (JD mn)	341[2]	354[2]	311[2]	299[2]	198[2]	167[2]	135[6]	--
Exchange Rate (JD/$)	.298[2]	.330[2]	.352[2]	.363	.385	.395	.350	.340[7]

Sources: [1]Jordan - Ministry of Planning (3825)(3829).
[2]*EIU World Outlook 1986*, 1986 (3935).
[3]MEED, v. 32/33, 8/19/88 (4250).
[4]U.S. Department of State, Jun 88 (4217).
[5]Philip Robins, *Jordan to 1990: Coping with Change*, Dec 86 (3726).
[6]*EIU World Outlook 1987* (3936).
[7]MEED, v. 31/51, 12/19/87 (4218).
All others from U.S. Embassy, Amman, *Foreign Economic Trends and Their Implications for the United States*, Apr 88 (4111).

The manpower issue relates directly to water issues in several ways, among the more important being: agricultural and industrial production which are controlled by and in turn impact on water availability and consumption; per capita consumption of water; municipal growth and population distribution; overall economic growth which depends on adequate water supplies; and, obviously, the issue of low manpower expertise in the water subsector which makes the solution of Jordan's hydrological problems more difficult.

The rate of participation in the labor force has fluctuated over the past 20 years owing to the increase in the ratio of Jordanians under 15 years of age, increased enrollment in educational institutions at all levels (32.4% of the population), and increasing trends of labor emigration. Presently, the Jordanian workforce consists of about 20% of the domestic population, or about 502,400 workers, of which 12.5% or 62,750 are women (a fourfold increase over the 1961 figures for women in the laborforce). The number of people entering the workforce each year through 1984-85 has averaged 3.5%, just about equal to the rate of population growth. However, that rate has been rising significantly over the past three years, and an approximate 6% annual accretion is expected over the next five years. Illiteracy stands at approximately 28%(3825)(2394)(3854)(0288)(3843)(3879)(3550)(3935)(3936)(3826).

Table 2.5
JORDANIAN MANPOWER BY ECONOMIC ACTIVITY

Economic Activity	1961		1979		1985*	
	Number	(%)	Number	(%)	Number	(%)
Agriculture	79,277	33.5	46,728	11.5	39,237	7.8
Mining & Manufacturing	22,278	10.2	34,935	8.6	53,053	10.6
Electricity & Water	925	0.4	2,472	0.6	5,526	1.1
Construction	22,187	10.2	52,645	13.0	55,263	11.0
Trade	17,452	8.0	41,541	10.3	50,239	10.0
Communications	7,624	3.5	28,977	7.2	47,225	9.4
Financial Services,**	---	---	8,673	2.1	17,132	3.4
Social Services, Public Administration & Defense	7,468	34.2	189,303	46.7	234,718	46.7
TOTAL	217,840	100.0	405,274	100.0	502,393	100.0

* 1985 figures are estimates.

** Included in social services in 1961.

Source: Jordan - Ministry of Planning(3825).

Manpower migration, mainly to the Gulf, rose from a mere trickle of 41,000 in 1961 to 339,000 in 1985. Because of short-term fluctuations, the actual percentage of Jordanian workers who have emigrated to the Gulf is between 40-45%. This circumstance, while providing much needed hard currency through remittances, has produced labor shortages in Jordan, especially in agriculture, which have had to be filled by imported foreign labor.

It is important to note that foreign laborers in Jordan, like Jordanians working in the Gulf states, repatriate their earnings. However, the significant fact here is that the remittances sent out of Jordan by foreign workers equals the total of Jordan's earnings from the export of agricultural products, which is 19% of exports, thus offsetting the advantage of agricultural export earnings.

Labor shortages in Jordan are intensified by the Jordanian system of rigidly linking salary and status to academic degrees. Consequently, efforts to promote vocational training have been largely unsuccessful (only 12,000 students enrolled in vocational schools between 1981-85). Under this system, Jordanians leave low skill jobs to foreign workers. Foreign labor currently numbers in the range of 120,000, down from about 143,000 in 1982-83 because of reduced oil revenues and economic decline in the Gulf. The Jordanian government has in the past year curtailed the employment of imported labor.

Combining Jordanian and foreign workers yields a total labor force in Jordan of 622,400 (3825)(3829)(3854)(4057)(0288).

2.2. Economic Structure

The economic structure of Jordan is determined by various factors, including the availability of economic and natural resources, water being the most important among the latter. Agriculture, the sector most concerned with water and most affected by climatic fluctuations, has throughout the 1980's contributed a relatively low average of 7.7% to the GDP. Agricultural workers constitute 14% of total labor in Jordan, or about 87,132 farm workers. Of this total, 49,700 (57%) are imported laborers, mostly Egyptian fellahin. Clearly, agriculture absorbs the single largest block of expatriate foreign laborers (42%) in Jordan (3827)(3829)(3854)(4057).

Despite the absence of reliable data on the movement of Jordanian agricultural labor, the logical corollary of these statistics is a loss of Jordanian farmers to internal and external migration. This movement of farm workers can be attributed to several factors: difficult on-farm conditions produced by drought; maldistribution of water and other inefficiencies; marketing bottlenecks and foreign competition; higher wages in both domestic and Gulf industries; the active recruitment of Jordanian farmers by the Arab states; and the tendency of fewer young Jordanians to go into farming. To stem the flow of domestic rural-to-urban migration, the Ministry of Municipal and Rural Affairs and the Environment has been implementing projects intended to improve the quality of rural life. Water pipelines have been laid, electricity cables strung and roads completed (2394)(3932)(4112).

Three of the macro ecomonic indicators that generate concern among Jordanian policy makers are GDP growth rate, manpower/ unemployment, and the budget deficit. These indicators, which largely set the level of government spending, are prime determinants of the rank of priority and amount of investment water receives from the government.

2.2.1. GDP Growth

Jordan continues to experience the painful chronic effects of the Middle East regional recession brought on by retrograde oil revenues since 1982. This circumstance has produced greater realism among Jordanian planners. The current Five Year Plan is based on a targeted GDP growth rate of 5% per year. This contrasts with a projected 11% annual GDP growth in the preceding 1981-1985 Plan, a period which registered a real growth of only 3.5% per year. After a grim growth of less than one percent in 1986, government economists now speak of an average 3-4% rate. Real growth is actually running at about 2-3%, and should be sustainable at that level barring dramatic downward turns in key sectors. However, the prevalent recessionary conditions in the region almost certainly make even the more reasonable growth and investment targets of the current Five Year Plan unattainable.

Table 2.6
ANNUAL REAL GROWTH RATE (1981-1985)
AND PLANNED GROWTH RATE (1986-1990)
(%)

	1981-1985 Plan		1986-1990 Plan
	Planned	Actual	Planned
1. GDP (at factor cost)	11.1	4.2	5.1
2. Net indirect taxes	11.0	15.8	9.2
3. GDP (at market prices) (1+2)	11.1	5.3	5.7
4. Imports of goods and services	13.7	2.9	2.7
5. Total available resources (3+4)	12.5	4.2	4.3
6. Consumption	8.0	4.7	3.2
7. Investment	12.2	0.8	5.3
8. Exports of goods and services	21.7	3.4	6.1
9. Total uses (6+7+8)	12.5	3.5	4.3

Source: Jordan - Ministry of Planning[3829].

Agriculture remains the most volatile of the vital economic sectors. Although good rainfalls in 1986 and 1987 somewhat mitigated the water shortage, they by no means solved it. All of the other problems of water scarcity, inefficiency, maladministration, and deficient infrastructure persist, making agriculture the most variable sector. Yet fluctuations in this sector have not so far caused significant flutters in other major sectors.

Fortunately, the predicted reduction in remittances from Jordanians in the Gulf has not come to pass. Although there was a slight rise from JD 403 million in 1985 to JD 414 million in 1986, this was a temporary phenomenon as remittances declined in 1987 to JD 319 million, leaving remittances at present in a state of mild stagnation rather than sharp decline (3827)(3936)(3935)(3843)(4111)(3555).

2.2.2. Unemployment

A major reason that the darker predictions have not transpired is that fewer Jordanians than expected have returned from the Gulf, easing fears that repatriated workers would bloat the ranks of the unemployed. Jordanians are among the best educated and skillful expatriates in the Gulf states, and are not viewed as politically threatening. Therefore, they tend to hold on to their jobs longer. Thus the net return of expatriated Jordanians has been relatively low, and many of those who have returned appear to have come back with enough money to set up in business (4111)(3843).

This is fortunate for Jordan because its unemployment picture is in general one of darker tones. The economy is not growing fast enough, nor is future growth predicted to be sufficient, to absorb the anticipated 6% annual increase of Jordanians coming onto the labor market, including some 45,000 graduates a year who expect to be given work in professional and semi-professional posts. Official figures put unemployment at 8%, one in twelve of the domestic workforce, while unofficial estimates claim a rate of 12.5% of the domestic workforce, or one in eight out of work. It is the trend that matters. Unless unemployment is controlled, and assuming the regional recession continues as expected until 1992, then, by conservative estimates, as many as 14%, i.e., one in seven members of the domestic workforce, could be jobless by 1990. Generally, as unemployment rises, per capita income drops, which then contributes to more unemployment (3843)(4111).

The unemployment situation also emerges as ominous in a 1987 study conducted by the Jordan's Royal Scientific Society. The RSS placed unemployment at 7% in 1986 and predicted a 10% jobless rate by 1990. This estimate is considered low by Jordanians and other expert observers. The World Bank projects that unemployment could go as high as 30% by 1990. However, the most politically significant data in the RSS study reveals that two-thirds of Jordan's unemployed are under the age of 30, 55% are married, and between 40-49% of the jobless are college graduates (3783)(4111).

This state of national unemployment contains potentially serious consequences. The increasing jobless total, which includes well educated Jordanians, could pose the most urgent domestic political challenge to the government. For this reason there is an incipient movement away from a large capital-intensive focus toward emphasis on labor-intensive

enterprises, especially agriculture, together with greater attention to both import substitution and commodity export activities. Expansion of agriculture and industry, the productive sectors, appear to be the government's principal instrumentality for reducing unemployment.

But enlargement of both these sectors is seriously constrained by Jordan's chronic water shortage, in agriculture more than in industry. Further, an expansionist policy will increase competition for usable water (whose total quantity is not expected to increase significantly) among agriculture, industry and the municipalities, in the face of rising demands from a rapidly growing population. The proposed solution will be difficult to achieve and will likely generate domestic political tensions.

Jordan's high population growth rate has forced the government to shift from what had been a largely pastoral and agricultural economy until the mid sixties to a concentration on the development of human resources through a labor exporting services economy.

Therefore, the services sector will probably continue to be the paramount contributor to GDP and the provider of the largest number of jobs. The services sector dominates the structure of Jordan's economy: it accounts for 61% of GDP, 66% of the domestic labor force, and 33% of foreign workers (second only to agriculture). According to Jordan's current Five Year Plan, investments in agriculture, water and electricity, and transportation (which bridges the service and infrastructure sectors, and also concerns the distribution of water) are expected to rise only in modest increments(3829)(3934)(3935)(3936).

Table 2.7
SECTORAL CONTRIBUTION TO GDP*
(%)

SECTOR	1985	1990
Agriculture	8.2	9.4
Mining	4.2	4.8
Manufacturing Industries	12.3	13.4
Water & Electricity	2.6	2.5
Construction	9.1	8.7
Total Commodity Producing Sectors	36.4	38.8
Trade	18.8	17.9
Transportation & Communication	11.2	11.5
Government Services	18.9	18.2
Other Services	14.7	13.6
Total Services Sector	63.6	61.2
GDP (at factor cost)	100.0	100.0

* (Like much of the data presented in the Plan, the figures are not always consistent and must be treated with caution).

Source: Jordan - Ministry of Planning(3829).

The current Five Year Plan envisions 201,000 new jobs by 1990 to be achieved largely in the following way:

(1) -- 97,000 through investment programs
(2) -- 50,000 by replacing foreign workers with Jordanians
(3) -- 29,000 through death and retirement
(4) -- 25,000 by outmigration replacements

Total 201,000

Total employment projected by the Plan is 703,000 by 1990 which it is assumed will consist of 610,000 Jordanians and 93,000 foreigners. Agricultural sector workers are expected to increase to 102,00 while water and electricity jobs are seen as rising to 8,000, up by 1500[3829].

Table 2.8
EXPECTED JOB OPPORTUNITIES BY ECONOMIC SECTOR
DURING PLAN YEARS 1986-1990
(in thousands)

SECTOR	1985 Employment* Jord.	For.	Total	New Jobs
Agriculture	36.1	49.1	85.2	16.7
Mining	6.3	1.5	7.8	1.6
Manufacturing Industries	42.5	9.9	52.4	11.0
Electricity & Water	5.1	1.4	6.5	1.5
Construction	50.8	44.3	95.1	12.3
Total Commodity Producing Sectors	140.8	106.2	247.0	43.1
Trade	46.2	12.1	58.3	7.6
Transportation & Communication	43.5	7.9	51.4	11.2
Government Services	215.9	13.9	229.8	33.5
Other Services	15.8	2.9	18.7	1.9
Total Services Sector	321.4	36.8	358.2	54.2
Grand Total	462.2	143.0	605.2	97.3

* These 1985 figures differ from figures found elsewhere in the Five Year Plan (3825) (see Table 2.5, p. 5).

Source: Jordan - Ministry of Planning[3829].

These employment numbers are problematic in several respects, beginning with the fact that of the components that constitute the total "new" job opportunities, only item (1) represents a category of genuinely new positions. Moreover, the 703,000 total employment figure is arrived

at by adding the 201,000 "new" jobs to the current Jordanian workforce of approximately 502,000 Jordanians, exclusive of immigrant workers, listed as employed in 1985, rather than the 645,000 total 1985 workforce which includes 143,000 foreign laborers.

Additionally, as regards jobs and water, there are indications that the water bureaucracy would not necessarily benefit from significantly larger numbers of employees. Rather what is needed is reorganization or rationalization of functions that emphasizes greater efficiency and expertise, and more effective distribution of manpower.

2.2.3. Budget Deficit

Jordan's budget deficits are for the most part directly traceable to the recession in the Gulf. The healthy economic growth rate of about 8% per year from the mid 1970's to 1982-3 had been heavily dependent on Arab aid commitments and workers' remittances from the Gulf, and on exports to the Gulf markets. Between 1976 and 1983 these sources accounted for as much as two thirds of GDP. Economic expansion was rather abruptly replaced by deceleration when decline in international oil prices precipitated a recession, first among the Gulf states and then region wide. In this context, it is usefull to recall that Jordan's intended solution to its own Gulf related recession, expansion in agriculture and industry, is seriously constrained by water scarcity.

Arab aid fell off by 50% from $1.3 billion in 1980 to $680 million in 1986. That downward slide has continued. Moreover, not all of the Arab governments that signed the 1979 Baghdad Agreement to provide Jordan with aid have honored that commitment. Saudi Arabia, one of the four Arab countries to fulfill its obligation, provides $360 million a year. Apart from Arab aid, the U.S. increased its economic assistance from $95 million to $111 million in 1987 with a one-time only supplement. Jordanian workers' remittances fell off by 29% from a high of $1.2 billion in 1984, rebounded in 1986 to $1.185 billion, and have fallen off again in 1987-88 by an estimated 9-10%. Exports to the Gulf dropped from $152 million in 1984 to $138 million in 1986[4111][4036][3980][3934] (see Table 2.3, p. 4).

As indicated, Jordanian authorities have taken vigorous counter-recessionary measures, chiefly by going over to a policy of expansionary budgeting from a former position of fiscal restraint. Expenditures leapt from JD 720 million in 1984 to JD 990 million in 1986. Monetary policy also became expansionary, restrictions were placed on crops produced in surplus while others were subsidized, and measures were adopted to stimulate foreign investment, especially from Arab countries. Assisting the government's efforts has been a rise in several exports, and a decline in imports and lower oil bills attributable to the economic recession. Authorities have also cut various subsidies and improved the collection of taxes[4111][3980][4036].

However, these ministrations have not revived the economy or enabled the absorption of increased numbers of new entrants into the labor force. As a direct consequence of the expansionary budget policy, the budget deficit has risen from 5% of GDP in 1983 to 14% in 1986, with financing supplied mainly from foreign borrowing. If foreign grants are excluded, the budget deficit climbs to 23% of GDP in 1985 and 28% in 1986. In the same period, revenues increased very little, and private investment reached a low of JD 177 million in 1987, less than half the level of investment in 1982.

These budgetary deficits have had a negative impact on Jordan's external balance of payments. Convertable foreign currency reserves fell from a peak of JD 354 million ($955.8 million) 1982 to JD 142 million ($383.4 million) in 1986, a 60% plunge. In the same period Jordan's external public debt (excluding the military debt) almost tripled from $1.2 billion in 1980 to $3.4 billion in 1986, a shift that was roughly equal to 60% of GNP. However, in one area, the government has performed successfully. Jordan has succeeded in maintaining exports, narrowing its trade gap from a negative $2.5 billion in 1983 to $1.7 billion in 1986, which has had a positive effect on Jordan's current account balance despite the fall off in Arab grant aid(4111)(3934)(3936).

The implications that Jordan's current economic trends hold for water issues can be seen in a summary of the principal targets that have been established for the third Five Year Plan, 1986-90. These are: 1) An average real GDP growth rate of 5% 2) Creating 97,000 new jobs beyond the replacement of 50,000 foreign workers with Jordanians 3) Decreasing consumption from 111% of GDP to 99% 4) Increasing domestic revenues from 80% of recurrent expenditures to 100% 5) Reducing the deficit in the balance of trade in goods and services from 36% of GNP to 21% 6) Advancing Arab economic integration and a more balanced region wide economic growth. Even though the Third Five Year Plan is not irrationally ambitious, as has already been indicated, the prognosis for achieving the growth and investment targets is poor because of the regional recession. This means, among other things, that Jordan will have to resort to world capital markets for a significant portion of its development money. But, even for a country with Jordan's sound credit rating, acquisition of large amounts of foreign development capital has become steadily more difficult and the competition for such money among developing countries has stiffened accordingly. Moreover, Jordanian private sector investment, which has retreated into caution since 1982-3, is highly unlikely to bridge the gap between public expenditures and foreign capital, particularly without improved cost competitiveness by Jordanian agriculture and industry. Although OECD loans and EEC assistance have for the time being held up, and Japan granted Jordan a $300 million loan in October of 1987, these funds have not offset the 50% fall-off in Arab grants or the $10 million drop in allocated US aid which complicates the capital market scene for Jordan(4111)(4092)(4057)(3843)(3866)(4062).

What these facts purport is that Jordan's budgeting resources for investment in water - indeed, in all sectors - will remain constricted over the next five years. This means that there will be inadequate opportunity to install urgently needed infrastructure projects and conservation technology, thus amplifying the possibility of a serious water crisis before another decade passes.

Table 2.9
SUMMARY OF WATER AND IRRIGATION PROJECTS
(JD '000)

	1986	1987	1988	1989	1990	Total
1. Irrigation	8,717	8,370	13,377	10,272	12,366	53,102
2. Dams	7,156	2,933	6,255	16,710	30,916	63,970
3. Water Resources	---	4,089	2,425	3,095	2,750	12,359
4. Water Network	7,318	15,567	15,583	14,836	9,946	63,250
5. Sewerage & Wastewater	29,465	19,258	18,526	9,299	11,142	87,690
TOTAL	52,656	50,217	56,166	54,212	67,120	280,371

Source: Jordan - Ministry of Planning(3801).

Table 2.10
SOURCES OF FINANCING WATER AND IRRIGATION PROJECTS
(JD '000)

	1986	1987	1988	1989	1990	Total
1. General Budget	25,860	20,527	23,084	22,603	28,689	120,763
2. Foreign Loans	26,796	29,690	33,082	31,609	38,431	157,863
TOTAL	52,656	50,217	56,166	54,212	67,120	280,371

Source: Jordan - Ministry of Planning(3801).

2.3. The Five Year Plan

Restraints in water subsector investments are evidenced in a comparison between the Second Five Year Plan 1981-1985 and the current 1986-1990 Plan. The Second Plan allowed JD 276 million (53% of total water sector allocations) for irrigation and dam projects; JD 113 million for water resources development (21%); water networks JD 59 million (11% of allocation); and waste water networks were allowed JD 77 million (15%) - a total allocation of JD 525 million. Actual expenditures, however, added up to only JD 245 million.

Table 2.11
BRANCH SECTOR ACTUAL EXPENDITURES

Branch Sector	Amount (JD mn)	Percentage (%)
1. Irrigation & Dams	71.8	29.3
2. Water Resources	79.0	32.1
3. Water Networks	35.0	14.3
4. Wastewater Networks	59.5	24.3
TOTAL	245.3	100.0

Source: Jordan - Ministry of Planning[3801].

The discrepancy between total allocations and total amount actually spent is accounted for by the non-implementation of the Maqarin Dam project, by difficulties in financing various projects, and by the failure to complete project studies and designs on schedule.

When the relevant data from the Second and Third Five Year Plans are combined, it becomes clear that investments in the water branch sector will not increase between 1986-1990.

Table 2.12
COMBINED PLANS ALLOCATIONS
(JD million)

	81-85 Planned		81-85 Actual		86-90 Planned	
	JDM	(%)	JDM	(%)	JDM	(%)
Dams & Irrigation	276	53	72	29	117	42
Water Resources	113	21	79	32	12	4
Water Network	56	11	35	14	63	23
Wastewater Networks	77	15	60	25	88	31
TOTAL	522	100	246	100	280	100

Source: AMER

Total actual expenditure in 1981-1985 was 47% of planned allocations, including the JD 200 million for the Maqarin Dam. But if the Maqarin Dam allocation is excluded, then actual expenditures would rise to 76% of those planned. Of the JD 117 million allocated for 1986-1990, only JD 10 million is earmarked for the Maqarin (i.e., Unity) Dam, a negligible sum.

Thus planned investments for the water branch sector are 13% less than allocated expenditures in the 1981-1985 Plan (excluding funds for Unity/Maraqin), but 14% more than the amount actually spent for 1981-1985. However, given the negative discrepancy between planned investments and actual expenditures in the last two five year plans, there exists a strong probability for a similar disparity in the current Five Year Plan. But, because the planners of the 1986-1990 Plan appear to have labored within fairly realistic parameters, any discrepancies that do appear should be of a smaller order than those in the previous plans.*

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* See Annex 1 for detailed listing of water projects in Jordan's Five Year Plan for 1986-1990[3801].

At the same time, whatever story these figures tell, Jordanian planners are fully cognizant of what the country's major water problems are. This, in summary, is how government economic planners delineated them in the Third Five Year Plan:

1) Development of at least 934 Mcm by the year 2000.

Table 2.13
QUANTITIES OF WATER TO BE DEVELOPED UNTIL YEAR 2000
(Mcm)

	1985	1990	1995	2000
Domestic and Industrial	111	152	196	247
Irrigated Agriculture in the Ghor Areas and Wadi Araba	309	453	524	587
Irrigated Agriculture Outside Ghor Area	100	100	100	100
TOTAL	520	725	820	934

Source: Jordan - Ministry of Planning[3801].

These figures are based on a per capita water consumption rate of about 88 l/c/d in 1985-86, expected to rise to about 120 l/c/d in 2000, and on the assumption that close to 100% of the population will be supplied with continuous water flow from networks to be established.

2) Lack of policy concerning a balance between water availabliity and need.

3) Lack of compliance with water regulations and failure to update legislation to deal with emergency water problems.

4) Insufficient documentation of water data, and poor monitoring and surveillance of water projects.

5) Insufficient studies on water resources evaluation, and those undertaken do not cover all of Jordan.

6) A growing need for subterranean drainage in irrigable land.

7) Obsolescence and poor repair of distribution networks in major cities and of irrigation networks leading to a high rate of water loss.

8) A low level of management and utilization.

9) Insufficient management has led to decline in water quality in various groundwater basins.

10) Higher costs of extending sewerage and wastewater networks owing to topographic and geologic factors and to long distances involved in carrying wastewater to treatment locations.

11) Seepage of rainwater into public sewerage networks which harms the safety and efficiency of treatment plants[3801].

Solutions of these problems clearly require a larger investment of funds then those allocated, from both domestic and foreign sources, in the current Five Year Plan. The relative importance of water and irrigation investments in relation to total investments has declined over the last three Five Year Plans, from 13% in the 1976-1980 Plan to 8.0% in the 1986-1990 Plan (The 1981-1985 Plan called for 15.8% but actually expended about 10%). (See Table 2.14).

This descent in water investments reflects present structural constraints with in the Jordanian economy. The World Bank has recommended a sequenced investment ranking for the most important large scale water projects which is being considered by the Jordanian authorities. This ranking reflects both need and feasibility of implementation (see Table 2.15).

Table 2.14
RELATIVE IMPORTANCE OF SECTORAL INVESTMENTS
IN THE THREE FIVE YEAR PLANS

	% Planned 1976-1980	% Planned 1981-1985	% Planned 1986-1990
Administration & Legislation	---	---	0.02
Science & Technology	0.77	0.22	0.4
Environment	---	---	0.05
Total Comprehensive Sectors	**0.77**	**0.22**	**0.47**
Manpower	0.63	0.28	0.13
Social Development	---	0.46	0.82
Women	---	---	0.12
Culture & Youth	---	0.3	1.15
Health	1.18	3.05	2.0
Education	4.9	6.86	4.9
Higher Education	---	---	3.0
Awqaf	0.72	0.19	0.55
Information	---	0.24	0.67
Housing	10.85	8.8	16.63
Government Buildings	0.39	0.54	1.28
Tourism & Antiquities	3.18	1.99	2.1
Trade, Supply, Customs & Free Zone	0.49	1.12	1.04
Municipal & Rural Affairs	5.07	5.32	4.9
Total Services & Social Sectors	**27.41**	**29.15**	**39.29**
Construction	---	---	3.2
Transportation	15.67	16.53	14.4
Communications	2.62	3.24	3.12
Energy & Resources	5.60	4.95	8.47
Water & Irrigation	12.73	15.81	9.0
Total Infrastructure Sectors	**36.62**	**40.53**	**38.19**
Agriculture	5.24	7.11	9.43
Industry	29.96	22.99	12.62
Total Commodity Producing Sectors	**35.2**	**30.1**	**22.05**
Total Investments	**100.0**	**100.0**	**100.0**
Overall Investment Size (JD mn)	**765.0**	**3300.0**	**3115.5**
Actual Investment Size (JD mn)	**879.6**	**2636.1**	
Implementation Percentage (%)	**115.0**	**79.9**	

Source: Jordan - Ministry of Planning(3829).

Table 2.15
INVESTMENT RANKING

Project	Use	Start Date	Commission Date	Water Mcm/Yr	Capital Cost JD/Mcm
Wadi Wala Stage I	M&I	1988	1989	15	0.41
Mukheiba/Northern Conveyor Stage I	M&I	1989	1991	45	1.34
Unity Dam	M&I and Irrigation	1990	1993	150	0.71
Southern Aquifer for South Jordan	M&I	1991	1992	20	0.5
Side Wadi Dams in Jordan Valley	Irrigation	1990	1992	12	0.85
Karameh Dam	Irrigation	1992	1995	35	1.27
Wadi Mujib	Industry & Irrgtn.	2000	2003	25	0.63
Qa-Disi Southern Conveyor	M&I	2002	2005	100	2.53

Source: World Bank(4092).

2.4. Uses of Water by Sector

Where Middle Eastern water is concerned, it appears that only occasionally will the researcher be able to work with an agreed upon set of data as being definitive. The use of water by sector in Jordan is not, unfortunately, one of those occasions. There are five major sources for this data: *Jordan Water Resources Sector Study* from the World Bank(4092), *Five Year Plan for Economic and Social Development 1986-1990* from the Jordanian Ministry of Planning(3801), *National Water Master Plan of Jordan* (vol. 5 and 6) from the Jordanian Natural Resources Authority(2820)(3094), *Water Use Strategy, North Jordan* (vol. 3, 4 and 5) produced for the Jordanian National Planning Council by Howard Humphreys and Sons(2824)(2825)(2826), and AMER. None of these sources concur precisely in their data, though they are all relatively close. Since the Master Plan and Humphrey's Report have been superceded by the World Bank Report, the Five Year Plan and AMER, it is useful to compare only the latter three sources. In most subsequent discussions, AMER's calculations will be used as the basis of analysis.

Table 2.16
USES OF WATER BY SECTOR
(Mcm/yr)

Sectors	1985			1995			2005		
	AMER	FYP	WBR	AMER	FYP	WBR	AMER	FYP	WBR
M & I	120	111	160	196	196	235	247	247	335
Irrigation Jordan Valley and Wadi Araba*	350	309	284	524	524	358	587	587	347
Irrigation High Lands**	227	227	234	227	227	220	227	227	206
TOTAL	697	647	671	947	947	820	1061	1061	896

* Assumes the Unity Dam will be built. AMER has factored this assumption into the calculations for the sake of comparison with the Five Year Plan and the World Bank Report which made the same assumption. However, owing to the nature of the political problem with Israel and the shrinking capital market, AMER analysts believe the prognosis for building the Unity Dam within the next decade is poor and at best problemmatical beyond that time. The World Bank Report does not include Wadi Araba in its Jordan Valley calculations.

** The groundwater portion of these figures are only estimates since most groundwater in the highlands is privately owned and unmetered (also in Qa-Disi).

Sources: AMER; Jordan - Ministry of Planning(3801); World Bank(4092).

Again, what these projections of water use imply is strictured consumption because of lack of water. It is highly unlikely that Jordan will be able to increase agricultural production significantly through the horizontal expansion of irrigated lands. And if an attempt is made to do so, it will have to be at the expense of M&I. Either way, economic development would suffer.

2.5. Pricing of Water by Sector

The issue of water pricing in Jordan is complicated by various factors, including government subsidies, inefficient administration and collection of fees, widespread meter cheating, and political influence. Pricing is scheduled by region of the country and varies from sector to sector (see Table 2.17).

The price of irrigation varies according to locale and source. The countrywide average is about 10 fils/m^3. The average is kept at a relatively moderate level by the low flat fee of 3 fils/m^3 charged in the Jordan Valley where the greatest volume of irrigation water is used. This rate has been unchanged since 1974. In other districts the cost is

exponentially higher depending on the source, conveyance, and the depth of wells. For example, in Mafraq it costs 87 fils to pump one cubic meter from a depth of 250-350 meters, while in Jarash, where the depth is 120 meters, the price is only 35 fils.

Table 2.17
PRICING OF WATER
Fils (1000 fils = 1 JD)

Amman - per quarter per meter	Price - fils per cubic meter
0-20 m^3	120
20-40 m^3	200
40-100 m^3	400
100 m^3 and above	500
Water meter fees per quarter	225
Base fees (least use) per quarter	1200

Environs of Amman and Northern Cities and Villages - per quarter per meter	Price - fils per cubic meter
0-15 m^3	80
15-45 m^3	96
45-75 m^3	300
75 m^3 and above	400
Water meter fees per quarter	225
Base fees (least use) per quarter	1200

Jordan Valley - flat fee	Price - fils per cubic meter
Domestic Use	100
Industrial Use	10
(no meter or base fee)	---

Zarqa, Aqaba and Southern Cities and Villages - per two months per meter	Price - fils per cubic meter
0-20 m^3	80
20-40 m^3	96
40-100 m^3	300
100 m^3 and above	400
Water meter fees per two months	150
Base fees per two months	1200

Water Tank Services (all purposes)

Tank Capacity	Amman	Outside Amman
5 m^3	2500 fils	3000 fils
8 m^3	3000 fils	4000 fils
12 m^3	4500 fils	5500 fils

Source: AMER

The average cost of pumping one cubic meter in the uplands is 56 fils/m^3 as compared with 3 fils/m^3 in the Jordan Valley. There are about 1000 ha of highland irrigation dependent on artificial farm ponds. The farmers purchase water for these ponds from adjacent municipalities to irrigate an average of 10-20 plastic houses or tunnels covering 1-3 hectares. The average cost of this water is 300 fils/m^3 - 50 fils for pumping the water and 250 fils/m^3 for the municipality.

Cost of Water to Farmers
Fils/m^3

Jordan Valley	3
Deep Wells	36-87
Man-made Ponds (plastic houses)	300

Thus, although the price of water for farming in Jordan can be relatively high, it is nevertheless fairly profitable, and would be even more so if greater efficiency were practiced in both the water subsector and agricultural sector(4092)(3788)(4104).

There are also special price schedules for particular organizations and groups. For example, the fertilizer plant at Aqaba is charged a flat fee of 240 fils/m^3 for whatever amount of water is used, while the Hussein Medical Center in Amman pays, under the same arrangement, 350 fils/m^3. Drinking water in distribution centers costs the user (who transports it to the use site) 200 fils/m^3 in Amman and 400 fils/m^3 outside Amman. The army, police, and civil defense organizations pay a flat fee of 160 fils/m^3 in Amman and 350 fils/m^3 elsewhere (3788)(4104).

There exists a serious problem of unmetered water use in Jordan. Virtually all private sector water in Jordan, whether for industrial use or irrigation, is not metered. Consequently, no charges are levied on any of the water pumped from private wells, nor are there any restrictions on the rate of extraction. Although the government generally issues licences for wells, the licensed but unmetered well can be used for any purpose in any amount without paying a single fil. Public wells are usually metered but between 30-40% of the meters are estimated either to malfunction or to be inoperative. The meter records of public wells are kept either in the Water Authority of Jordan (WAJ) or in the JVA, depending on location. Unmeasured water is running as high as 49%; that is, 123 l/c/d of water is produced but only 63 l/c/d is billed, primarily because of deficient metering, billing, and revenue collection(4092).

There is also widespread meter cheating by private individuals in both urban and rural areas. Many city dwellers (40% by one reliable estimate) either unhook their meters or tap into a delivery water pipe before it runs into the meter connection. This same type of meter dodging is practiced in rural areas for both irrigation and domestic use. Because the diversion pipes are laid beneath the ground, and also because houses are so separated - 500 meters or more - it is very difficult to

detect such water misdemeanors. Even when occasionally water larceny is detected, the punishment, which is a small fine, hardly acts as a deterrent. Consequently, the practice of evading meters by laying diversion pipes has grown steadily more extensive, fed by the practice of bribing officials to turn a blind eye to this kind of thievery(4104).

2.6. Marginal Value and Cost of Producing and Delivering Water

The marginal production and delivery costs of water involve a set of factors different from those in pricing. Although production and delivery costs normally determine price which in turn is expected to recover related operations and maintenance expenses, and at least partial capital costs, the interaction among these three factors does not always follow this progression in Jordan. Owing to maladministration, subsidies, and poor cost recovery policies, only a fraction of those expenses are redeemed.

Cost of water production and delivery is normally calculated by adding capital costs, including interest and whatever opportunity costs of capital are involved, to cost of operations. By this formula, the average cost of water production and delivery for M&I for all of Jordan is about 190 fils/m^3. However, not all of the water produced is actually sold. Some 40% of water production is lost to network damage, cheating, and various inefficiencies. Therefore only 60% of water produced is sold to M&I users. Dividing the cost of M&I production by the cubic meters actually paid for would yield an average countrywide M&I real cost of 310 fils/m^3(3788).

The cost of producing and delivering irrigation water in the Jordan Valley is 50 fils/m^3 (35 fils for capital costs and 15 fils for operation), while in the highlands the cost runs between 50-100 fils/m^3. In addition to irrigation, other sources of production vary in cost. Well water ranges between 100-150 fils/m^3, the Deir Alla project stands at 300 fils/m^3 while the Azraq Project, which supplies Amman and Irbid, comes in at 220-250 fils/m^3(3788). Both of these projects produce water primarily for M&I purposes.

The government of Jordan has stated that its policy is to schedule water charges at a level sufficient to recover full operations and maintenance (O&M) costs of dams and irrigation distribution facilities, as well as a significant portion of capital investment costs. The policy was framed with the Jordan Valley explicitly in mind. However, the policy has not been implemented effectively, particularly as regards irrigation in the Jordan Valley where the flat fee of 3 fils/m^3 has not changed for 14 years. If two years of O&M costs, 1983 and 1986, are compared, it will be seen that O&M expenditures ranged between 13-23 fils/m^3. But, despite the fact that the arrangement for collection of water fees in the Jordan Valley is close to 100% (farmers receive water only if their accounts are not in deficit), nevertheless the current charges recover less than one-quarter of O&M costs and only a small fraction of water delivery expenses. Overall, the rate of O&M recovery in Jordan is less than 10%(4092).

Table 2.18
O&M BUDGET OF WATER DELIVERY IN THE JORDAN VALLEY
('000 JD)

O&M Budget		1983	1986
Salaries & Allowances		1694	1712
Other expenditures		285	609
		1979	2321
Irrigated area	(ha)	22,828	22,828
Volume sold	(Mcm)	154.9	99.5
Cost per ha	(JD)	86.7	101.7
	($US)	(242)	(285)
Cost per m^3	(fils)	12.8	23.3
	($US)	(0.036)	(0.065)

* See Annex 2 for other cost and recovery tables, including a comparison of recovery rates for the JV, Morocco and France.)

Source: World Bank(4092).

Highland farmers pay full development as well as O&M costs of irrigation water at the rate of an average of 56 fils/m^3. The lower than O&M recovery rate charged the farmers in the Jordan Valley constitutes a substantial subsidy to the agricultural sector of the Valley. The evidence indicates that this policy has led to inefficient use of water and to significant inequities between Valley and Upland farmers(4092)(3827).

This circumstance is a consequence of how water responsibilities are organized and administered in Jordan's bureaucracy. Among other factors involved in the cost of O&M is surplus man power which must be reduced if these costs are to be brought down. The Jordanian authorities are coming to grips with these problems and have already taken a large essential action in the creation of a new unified Ministry of Water and Irrigation in January of 1988. At the same time, the government has announced its intention to increase water charges adequate for the recovery of O&M costs. This process, if it is to achieve its goal, must be given a specific timetable for planning the increases and attaining the target, and also, it should be designed to recover a part of the capital costs as well*.

* See Annex 2 for further details on the cost of water.

2.7. Impact of Subsidies on Use of Water

For a wide range of justifiable or at least understandable social and economic reasons, governments habitually subsidize many products. Water is certainly no exception. The water situation in Jordan, has both benefited and suffered from government subventions. To the extent that water intersects with other major sectors of the economy - namely agriculture and industry - those branches also experience the impact subsidies have on water use.

In the agricultural sector, water subsidies, both in their application and removal, ramify in several complex ways. In general, because of water scarcity, farmers receive only the quantity of water required to irrigate their land, in reality often less than the volume needed because of deficient delivery systems and loss. Consequently, the subsidization of water for agriculture has relatively little effect on the amount of water used. The latter is governed by availability and conveyance limitations. Therefore, agricultural subsidies in Jordan serve the main function of making farm products competitive and profitable. For example, in 1987, a good rainfall year, water prices were reduced by 20%, but there was virtually no increase in use registered(3788). Clearly, what determined the amount of water used was not a lower price but rather availability, delivery and time (a single year was insufficient time to change cropping patterns or increase irrigation).

Although the abrupt lifting of subsidies on irrigation water would not lead to a substantial rise in on-farm water use, production costs would increase drastically. In the Jordan Valley, the production cost of 1,000 square meters of land (one tenth of a hectare) is calculated to be JD 80 (for vegetables, not fruits), of which water use accounts for only 12.5%. If the current price of water - 3 fils/m^3 in the Valley and 10 fils/m^3 national average - were to be raised to the level of real cost which is 50 fils/m^3, then the production costs of 1,000 square meters would rise to JD 120, of which 42%, or about JD 51, would go for water use. Domestic food prices would rise significantly and Jordan's agricultural export market competitiveness would decline commensurately. Both outcomes would confront Jordanian authorities with serious economic and political difficulties.

Furthermore, the removal of subsidies and resultant rise in the cost of water would almost certainly lead to a decrease in the amount of water used for the same irrigated areas. Were this to occur, there would be insufficient flushing and an accumulation of salts in the soil, which could result in soil salinization. Excessive soil salinity would diminish crop productivity, which would also pose serious economic and political problems for the government(3788).

There are still other consequential results that could proceed from the removal of subsidies. Almost certainly cropping patterns would have to be altered, from high to low water consumption crops. This too would have an impact on Jordan's market competitiveness, on the agricultural

sector's share of exports, and its contribution to GDP. Marginal irrigated land would be taken out of production and agricultural manpower would accordingly be reduced, presumably first among the foreign workers. The consequences of significantly reduced subsidies would also have social and political implications for Jordanian agricultural landlords (some of whom are absentee) as regards their socio-economic status and influence(3788).

But, at the same time, a phased and well planned reduction of subsidies would have countervailing positive outcomes, such as more economically rational cropping patterns, higher yields, and larger profit margins. In addition:

1) It could be expected that removal of water subsidies, especially if combined with the lifting of price guarantees, would provide farmers with greater incentives to maximize efficiency and conservation.

2) Farmers could be expected to accelerate and increase the use of return flows (i.e., sewerage water, etc) which would be a valuable conservation and fiscal measure.

3) The government's efforts to encourage cultivation of alternate crops that have a better market and do not require large amounts of water could have more effect.

4) The government might be encouraged to conduct more research on alternative crops with low water requirements and good marketability, and to increase its marketing information services.

5) In order to soften the impact of subsidy removal, the government might also accelerate its efforts to repair delivery systems and reduce loss and waste.

6) If foreign labor were reduced, that would help stem the outflow of Jordanian currency sent abroad as remittances. In this context, it is well to recall that at present the outflow of remittances is equal to Jordan's earnings on its agricultural exports. By diminishing these remittances, Jordan would earn more net profit on its farm exports(3788).

For most other uses of water, chiefly M&I, again because of scarcity and high price, subsidies do not cause significant overuse of water. However, need is on a sharp upgrade and will continue to rise for the foreseeable future. Consequently, subsidies will in the future have an effect on the competition for water allocation between agriculture and M&I.

If subsidies are curtailed on M&I water, the volume of water used for domestic purposes would be insignificantly affected. The per capita consumption of water in Jordan is already quite low (81 l/c/d to 83 l/c/d), and will not rise appreciably unless considerably more water becomes available, which is not likely. On the other hand, certain injurious consequences might flow from an across-the-board cut off of subsidies. Those elements of Jordanian society at the lower end of the

economic scale - poor rural villages, the refugee camps, the urban poor - when faced with higher water prices, would be compelled to reduce their use of water to a point below acceptable health standards causing health problems and lowering the quality of life for large numbers of Jordanians. Also meter cheating would likely become even more commonplace than it is now, with attendant negative impact on equitable distribution and cost of water.

Moreover, removing subsidies from industrial water could have both beneficial and harmful effects. Obviously the cost of industrial products would rise and the increase would be passed on to the domestic and foreign consumers. This would make Jordan's products less competitive in regional and world markets. But, as in agriculture, the loss of subsidies could lead to the practice of more efficiency, to more water recycling, and to the use in industry of lower quality water that is unfit for domestic or agricultural use(3788).

2.8. Alternate Sources of Water

Jordan's sources of water supply, including alternate sources, have been dealt with in chapter one. However, in the context of this economic analysis, it might be useful to dilate a little further on three aspects of Jordan's water sources: the Unity Dam, Euphrates water, and desalination.

Construction of the Unity Dam complex underpins much of Jordan's economic development plans in the agricultural and industrial sectors. This circumstance is thrown into vivid relief by the ancillary issue of Jordan's energy situation. Jordan relies almost entirely on imported oil for energy. The importation of oil constitutes one fifth of all imports in value and represents 80% of the total value of commodity exports. The average per capita consumption of oil in Jordan is eight barrels compared to the rest of the Third World which uses oil at the average per person rate of five barrels, while the Arab world consumes six barrels per capita on the average(1134). The high cost of energy in Jordan has had the effect of reducing the competitiveness of Jordanian products in regional markets despite the government's subsidies to oil derivatives used in industrial and agricultural production(3827). Even if Jordan were able to build Unity Dam and all the other planned dams such as Karameh, its energy bills would be relieved only a little, but not substantially reduced.

Because of the scarcity of water, the potential for hydropower generation in Jordan is very small. The only two existing hydropower plants in the Kingdom were built in 1987 and have a combined annual potential energy production of 12 million kwh, 0.2% of total anticipated power generation in Jordan in 1990. The Unity Dam would produce 15mw of which 75% (or 25-30 million kwh) would go to Syria under the new treaty(4092)(4224). Alternatively, if current explorations for oil in Jordan locate a significant domestic field, that would not only relieve the energy problem, but give a healthy boost to the economy. So far, except for small amounts of oil, the search has been inconclusive. Shale

oil development in Jordan is in its earliest stages. Extraction of oil by this means is very expensive and the amount of oil yield is uncertain. Moreover, shale oil extraction is a high water consumption process that requires its own additional allocation of water.

2.8.1. The Unity (Wahda) Dam

The general purpose of the Unity Dam is to provide regulated discharges for irrigation and M&I water in Jordan, and power generation for use in both Jordan and Syria. The Unity Dam as presently designed constitutes a significant scaling down from the original Maqarin Dam proposal. The Maqarin complex was to have been a 170-meter high dam, with a gross storage of 486 Mcm giving an annual average safe yield of about 200 Mcm. The complex would have encompassed several related projects that included the generation of 20 mw of electricity at the dam, ancillary irrigation construction, extension of the EGMC, and other projects. The total cost was estimated to be one billion dollars(4205).

The Maqarin was intended to satisfy the growing M&I water needs projected to be about 30% of all water in 2005 and 40% by 2015. To achieve this end, it was planned to allocate 120 Mcm or 60% of Maqarin's safe yield water to M&I by 2005, the remainder to be used for irrigation in the Jordan Valley(4205). However, several altered circumstances since 1979 have dictated a smaller dam design and a reevaluation of how the Unity's waters should be allocated:

1) Israeli and Syrian abstractions from the Yarmuk reduce the water available to Jordan by 163 mcm per year.

2) Less available water assumes less storage capacity is needed.

3) Construction costs of the dam have risen exponentially since 1979, making the more ambitious Maqarin design less affordable.

Even the cost of the smaller Unity Dam will press Jordan very hard financially. The World Bank, using construction costs of $225 million, estimates the initial investment price for Unity will be $28,000 per hectare of irrigated land or, calculated by unit cost, $0.97 per Mcm of gross storage capacity.* This compares with $0.11 per Mcm and $0.34 per Mcm for large dams in Tunisia and Cyprus respectively.

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* For AMER's higher cost estimate, see pp. 8 and 49.

Table 2.19
COST COMPARISON OF LARGE DAMS

Country	Dam	Gross Storage Capacity (Mcm)	Capital Cost (million $)	Unit Cost ($ per cu m)
Jordan	Unity	230	300	1.30
Jordan	Karameh	55	124	2.26
Jordan	Wadi Arab	20	48.3	2.40
Tunisia	Sidi Salem	550	550	0.11
Cyprus	Kouris	115	40	0.34

Source: World Bank[4092].

By the terms of the September 3, 1987 treaty with Syria, Unity would be a dam of 100 meters height with a gross storage capacity of about 220 Mcm and an average annual safe yield of 150-160 Mcm.* This tentative estimated yield is based on an assumed 1 in 10 year drought. A 1 in 5 year drought could be presumed to yield an average of about 200-205 Mcm per year, and a 1 in 20 drought year would yield less than 100 Mcm. That is, in five percent of the years of any century the yield would be 100 Mcm or less. The total cost of Unity Dam is estimated to run between $324 million (JD 120 million) and $351 million (JD 130 million)[3801][4205][4206](p.c.).**

* Until the results of the feasibility study conducted by Harza Engineering are available, exact reservoir yield and construction costs must remain estimates based on inferred data assumptions.
** JD 1 = $2.70.

Understandably, the Jordanian authorities have not as yet attempted to allocate the anticipated water discharge from Unity. However, projected needs for agriculture and M&I have been gauged. The picture that emerges reveals a complex and thorny problem confronting Jordan's planners.

The JVA has calculated that irrigation water demands will require at least 240 Mcm/year by 2005, drawn from the Yarmuk River by way of the Unity Dam. At the same time, some percentage of increase in water is to be diverted to the EGMC supplementing the current 120 Mcm per year flowing through the Canal. But, for JVA's irrigation needs to be satisfied from Unity's resevoir would require utilizing the entire annual average safe yield water of the dam. Furthermore, it is reliably estimated that M&I demands will require between 90-100 Mcm/year. (AMER's estimate is 99 Mcm)[3788][3801](CI).

Consequently, even before the dam is built, demands for Unity's stock far exceed the amount of water that it could actually provide. This condition obtains whether calculations are based on a 1 in 5 year or 1 in 20 year drought. The latter, with its less than 100 Mcm/year yield would constitute at a minimum a shortfall of 125-175 Mcm/year. Such a shortage in drought conditions would be disastrous. Jordan would be compelled to seek additional water supplies from outside the Kingdom with all the political and economic ramifications that move would entail.

These are worst scenarios, albeit the most probable ones. There is a better less ominous picture. Were the Unity Dam to be built and operated at optimum advantage, two thirds of its safe yield water (99 Mcm) would be combined with the safe-yield water from the Deir Alla project (28 Mcm) to provide M&I with 127 Mcm per year. Most of the remaining water would go for irrigation of the Jordan Valley which together with other sources would then be assured of a long term allocation of about 302 Mcm per year. Such a plan would also allow the costly development of the Disi aquifer for M&I use to be delayed until 2005[4092].

These various plans and scenarios illustrate the interconnections integral to water usage and the interdependence of water resource allocation decisions in Jordan. It also becomes apparent that surface and ground water and the water requirements for M&I and agriculture must be planned and developed simultaneously.

While the Unity Dam is pivotal to Jordan's development plans, it is not a panacea. Less available water, smaller storage capacity than originally anticipated, and higher capital costs translate into necessarily lower development targets, diminished chances that capital costs will be amortized, a smaller economic rate of return than the 13% projected for the larger capacity Maqarin Dam[4092], and the probability that some of the planned economic reforms such as reduction of subsidies will be postponed or negated.

However, more parlous for Jordan is the bleak prospect that the Unity Dam will not be constructed within the next decade or probably even beyond. If the Unity Dam does not come on line as planned, Jordan's economy and social development will suffer cumulative serious injury and the country's strategic reserve stock of water will probably have to be used. As previously stated, unless enough of the outstanding political issues among the Israelis, Jordanians, and Syrians are satisfactorily resolved - and remembering that the central problem of the Palestinians and the less central issue of Lebanon impinge importantly on all Arab-Israeli problems - construction on the dam cannot begin, or if begun, is likely to be significantly interrupted. Therefore, the prospects for building the dam can never be better than the prospects for a political settlement among the principal riparians. There is, however, one possible exception to this dark scenario. It is just conceivable that were an effective peace-seeking process generated, then water issues could be among those negotiated early in the exchange, and if successful would then have a strong positive impact on all other matters to be settled. But the odds of this situation coming to pass are long indeed.

2.8.2. Imported Water

As already demonstrated, between the present and 1995, owing to increased efficiencies, water supply will roughly catch up with demand. After 1995, demand will rapidly outpace supply again unless new sources of water become available either from domestic stocks or from abroad. The economic projections made in the current Five Year Plan are based on the existence of the Unity Dam. But if this analysis is accurate and there is no Unity Dam to augment the water supply, then sometime soon after 1995 Jordan will in all probability have to import significant quantities of water from abroad to meet its needs. Even if Unity is built, demand is growing at such a velocity that the importation of water will still be a likelihood sometime between 2005 and 2015. If water is not imported (or larger new stocks discovered) then development will have to be retarded to suppress demand.

Given the predicted growth performance of Jordan's economy in relation to its expanding population, if the country is obliged to import both water and oil, the political and economic challenges confronting Jordan will be acute, to say the least. In this context, the effort that Jordan is making to promote an Arab economic community aimed at rationalizing the region's economic resources and market, makes sound policy sense, especially since the area's water problems are most effectively dealt with on a region-wide basis.

The two most discussed outside sources of water are the Seyhan and Cehan Rivers in Turkey and the Euphrates in Iraq. Preliminary and sporadic exploratory talks have been held with representatives of both countries. The engineering capacity for piping water from either country exists; in fact, the American firm of Brown and Root has signed a contract to conduct a feasibility study of Turkey's so-called "peace pipeline" intended to ship water as far as the Gulf.*

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* AMER's analysts have concluded that the Seyhan and Cehan Rivers from which, as currently planned, the water for the pipeline would be drawn do not contain enough water for the project as envisaged.

2.8.3. Desalination

Whether water is supplied in this fashion by Iraq or Turkey (Jordan may end up taking water from both if it is available) the cost will be high. At this juncture, there is no reliable data yet generated and available from which to make accurate calculations of what the price might be, but where water is concerned, because it is essential to life, "high cost" is a very relative concept. Jordan, or any other water scarce country, can be expected to pay whatever price its economic resources will allow and still permit its society a tolerable standard of living. Beyond that point, the political situation is likely to become radicalized and the chances of conflict enhanced. In Israel, for

example, water costs $0.40-0.45/m³ bringing the cost of desalination within the range of acceptability(4202). The price of water in Jordan is already as high as $0.90-1.35/m³ in parts of the country, making desalination an economic prospect (see Tables 2.15 and 2.17, pp. 39 and 41).

For countries with coastal or other saline waters, desalination becomes a possible solution to some of their water problems. Approximately two thirds of global installed desalination operations are located in the Middle East. The following table summarizes the municipal and total desalination capacity of the region's major riparians.

Table 2.20
DESALINATION CAPACITY -- SELECTED COUNTRIES

Country	Municipal (m^3/day)	Total (m^3/day)
Egypt	7,986	10,875
Iraq	674	92,413
Israel	32,668	35,871
Jordan	---	1,488
Lebanon*	---	519
Sudan	---	227
Syria	---	781
Turkey	---	631

* This figure could not be verified.

Source: AMER, *Water Issues in the Middle East: Review of Technology*, Oct 1986(4204).

Desalination has been a water technology whose potential for solving water problems has always raised hopes, but which has not as yet been able to perform cost-effectively on a large scale. Consequently, desalination technology has so far functioned chiefly to produce a supplemental source of water except for small oil rich nations in the Middle East such as Kuwait where desalination provides most of the water for domestic use. Desalination technology, particularly reverse osmosis, has within the last four years improved dramatically in its enlarged production capacity and in a concommitant reduction of cost. Because the normal 20-year life-span of distillation plants currently operating in the Middle East is coming to an end, a major shift to the newer reverse osmosis process is highly probable with the result that more useable water will be produced through desalination in the near future. Nevertheless, there is presently a consensus of opinion among experts that the desalination technology that is projected to come on line by the end of the century will still not have the ability to provide the large quantity of water at an affordable price needed by countries such as Jordan. In Jordan's specific case, because of its geography and

population distribution, and tiny sea front, desalination could supply M&I needs cheaply only for the port city of Aqaba. Again, a large dregree of relativity must be allowed as regards what is an affordable cost of water in countries where water is scarce[4202][4204][4206][CI]. But this technology does produce important ancillary amounts of water and Jordan will probably need to build a desalination plant at Aqaba between 1995-2005[3788].

2.9. Public and Private Investment in Water Projects, Research and Technologies

The government of Jordan is the paramount investor in water projects and in water research and technologies. It is responsible for providing water infrastructure and delivery networks, and for policy, planning, regulation, and research. Yet the expenditures on these activities from the domestic budget are not impressively greater than water investments made by the private sector. The reason for this situation is that the larger capital costs are allocated from foreign assistance funds.

From 1981 to 1986 the average of investments by the private sector in water projects and water related activities was JD30 million per year. These expenditures were confined to the drilling of agricultural and industrial wells, to irrigation projects, and to land reclamation. This has been the consistent pattern of private sector water investments. Government planners anticipate that private sector investments will rise to an average of around JD40 million during the current 1986-1990 Five Year Plan.

Between 1981 and 1986 public sector domestic budget investments in water averaged JD50 million per year, and the 1986-1990 Five Year Plan calls for only a modest increase to JD55 million a year. These funds are for the most part allocated to the same kinds of activities as are covered by private sector monies but with some infrastructure projects added. Based on these figures, the total combined public and private annual investments from Jordanian sources for the decade of the 1980s will average JD85 million per year[3788][3801].

However, actual investments expended by the public sector must take into account funds from foreign assistance sources which are allocated to water related projects. As already shown, in the 1981-1985 Five Year Plan the government intended to spend a combined total of domestic and foreign aid funds of JD 522 million which constituted 29% of total public investments. But since 40% of planned investments were for the Marqarin Dam, which was not built, real investments totaled JD 246 million or 10% of total public investments. The current Five Year Plan calls for a JD 280 million investment in water or 16% of total public investments (see Tables 2.9 and 2.10, p. 13).

In Jordan, relatively little investment is made by either the public or private sectors in water-related research and technology. Altogether an average of only about JD 250,000 per year is expended on water research, and the private sector's share is negligible[3788]. In fact

research and the development of technology which are water related are very circumscribed in Jordan and confined almost exclusively to the universities, chiefly at the Water Research and Study Center at the University of Jordan in Amman whose research is sponsored primarily by the Ministry of Planning(3788). This makes Jordan essentially a consumer rather than a producer of water technology and innovation.

There are several reasons why this situation obtains:

1) A shortage of specialists. Although Jordanians place a premium on acquiring higher degrees in various specializations, the depth of talent in such non-traditional fields as are related to water is not very extensive.

2) A reciprocal of the shortage factor is underfunding and inadequate academic training programs and facilities which in turn are the result of undervaluing the general field of water science and management and related branches.

3) Research, feasibility studies, data gathering, etc. are usually subsumed under the various water projects funded by foreign aid. Because these activities are included in the project costs, they are usually performed by foreign specialists or consultants and companies, and institutions from the country providing the funds. Jordanians may or may not participate in the project, and Jordanian universities are not usually institutionally involved; rather it is a particular ministry and its bureaucracy that is the participant and beneficiary. Thus Jordanian universities and Jordanian scholars do not derive the benefits that could accrue from foreign aid water projects.

4) Jordan is not a wealthy nation and its economy is soft in a number of critical areas. There are insufficient monies to do all that needs to be done.

Although the private sector contributes little toward water research and technology, it quickly adopts new technologies such as drip irrigation, various fertilizers and biocides. Technologies are taken on as soon as resources and other conditions allow. On the whole, Jordan's private sector is fairly sophisticated and alert to the bottom-line value of innovative practices and technologies.

2.10. Prospects for Increased Efficiency and its Potential Impact

In some respects the prospects for increased efficiency in the use of water with concurrent advantages are quite good. In industry, because that sector uses relatively little water, improved efficiency will have only a marginal impact on water resources, unless, that is, the potash and shale industries, which are very water consumptive, expand on a large scale. The introduction of better water use and management is easily

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within reach of Jordan's industries at affordable costs. Increased efficiency such as recycling and the use of more low grade water would contribute to the overall efficiency and cost effectiveness of industry as a whole and make a little more water available to the other sectors.

It is in agricultural and municipal use where the impact of higher efficiency would be the greatest. In agriculture, there are several ways to achieve more efficiency, among them:

1) Upgrading the irrigation systems. The adoption of drip irrigation to replace sprinklers and furrow irrigation would conserve considerable amounts of water which could then be employed to irrigate additional land or farm more intensively. In those parts of Jordan where farmers have gone over from furrow irrigation to drip irrigation and plastic houses, some 30% in water conservation was achieved and productivity went up by another 30%. If drip irrigation and the use of plastic houses are implemented in all feasible areas of Jordan an average of 15% to 20% savings in water could be realized annually(3788).

Presently, in the Jordan Valley north of the Dead Sea, about 45% of the total irrigated hectares (10,454) are still supplied by gravity through an open canal system which diverts water from the EGMC. The remaining 55% or 12,368 ha receive water through a pressure pipe system which diverts water from either the EGMC or the Zarqa River. Overall conveyance and on-farm irrigation efficiencies vary from 38% for surface systems to 70% for pressure pipe systems (see Table 2.21).

The on-farm efficiency rates for sprinklers is about 67%, while that for drip systems is about 84%. However, the gains are somewhat offset by the 22% of land area under the pressure pipe system that is still irrigated by surface methods because the farmers are unfamiliar with the system and also because of the low price for irrigation water. A feasibility study for conversion of all remaining areas in the Jordan Valley to drip irrigation was completed in 1987. The costs were estimated to be JD 8 million ($22 million) for 5800 ha. The gains would warrant the conversion (the economic rate of return on the investment would be 29%) and the Jordanian government has given conversion high priority(4092).

Table 2.21
PRESENT EFFICIENCIES AND WATER REQUIREMENTS

Distribution	Areas (ha)	Efficiency (%) On Farm	Conveyance	Overall	Farm Turnout Water Requirement (Mcm)	Diversion Water Requirement (Mcm)
Surface	10,454	63	60	38	131	218
Direct Pipe	6,276	78	90	70	63	70
Pipe from EGMC	6,092	78	75	58	62	82
Total	22,828					

Source: World Bank(4092).

The water savings from more efficient irrigation systems would ramify across the agricultural sector, affirmatively affecting cropping patterns, production, profits and exports. Increasing numbers of farmers in Jordan, with government encouragement, are adopting drip and sprinkler irrigation, the former outpacing the latter(3788).

Virtually no savings would be gained if the domestic per capita consumption of water were lowered because the rate is presently approaching the lowest value in Jordan consistent with acceptable health standards. But major additions of water would accrue from upgrading, repairing and extending the water networks. In the Amman area alone network losses average around 50% of the pumped water, while for the entire country the losses are estimated to be around 40%(3788). Worldwide, network losses of up to 12% are considered tolerable. If losses in Jordan were to be reduced to this level, the savings of water would amount to betwenn 30 and 40 Mcm per year. Water that is presently saved is purified and pumped to various destinations but most of it is lost before it can be used(3788).

Chapter 3
FORMULATION OF POLICY ON THE USE OF WATER IN JORDAN

3.1 Introduction

In Islamic societies of the Middle East (and elsewhere) the critical factor in governing or reigning is leadership; leadership as it is embodied in the traditional concept of imama, that is, leadership of the Muslim community of true believers (umma). In Muslim political thought the umma constitutes the basic polity which transcends national boundary lines. According to Islamic political theory, policy formulation and decision making are primarily a function of leadership (the imam) with the participation of an elite peer group (including religious authorities), a process intrinsic to the idea of imama.

From this religiously based concept flow legitimacy, authority, and power, the right to rule or govern, to delegate authority, and to be obeyed. In modern times, under the superseding influence of Western nationalist ideologies, the Muslim community, for all practical purposes, became coterminous with newly created secular European-style nation states. It is to this secular political organism that traditional Muslim leadership has adapted itself and Muslim government.

But certain customs of rulership, deeply rooted in Islamic political culture, have carried over into the present. Leadership carries certain stipulated moral obligations toward Islamic religion. Also Middle Easterners historically have given their leaders extensive power over their destinies, demanding security, prosperity and justice in return, and expecting from their leaders a posture that ratifies the values of the society and confers legitimacy on the regime.

Consequently, Middle Eastern leaders bear weighty personal responsibility for the direction their countries take. The leader's attitudes and perceptions are critical in determining the policies and actions of his government. The leader's preferences determine the character of the government and its regional and global relationships. Within the conventional notion of imama, leadership is always personal and authoritarian.

The concept of imama has in practice produced systems of government that are centralized, authoritarian and oligarchical. As oligarchies, they function through a political elite which includes or is intimately associated with the military establishment whose support is deemed essential to the maintenance of the regime's power and stability. Indeed, for historical and cultural reasons, leadership has been commonly

drawn from the military. Although such regimes are authoritarian, and the ruler is usually the supreme arbiter of public affairs, his power is not absolute. In the Middle East, tenacious Muslim and tribal traditions require the ruler to consult with the political and religious elite (in Islam, often indistinguishable), which in turn is one of the ways by which leadership is legitimized. The particular segments of society that produce the ruling elite vary considerably from country to country, but rarely exclude the religious and military.

3.2 The Role of the Monarchy

Jordan fits this traditional model in its contemporary guise in virtually all respects. The government of Jordan is monarchical, oligarchical, authoritarian, and highly centralized. It functions at its top echelons through a civilian/military elite drawn from the nation's leading families, most of whom trace their origins to important bedouin tribes. The King is the ultimate decision maker, exercising his executive powers through the process of consultation with a civil-military ruling group whom he appoints from among the country's elite and from among his own extended family which represents the top crust of the nation's oligarchs. With the King's encouragement and in response to the country's needs, this class of leaders has become highly educated in its own right.

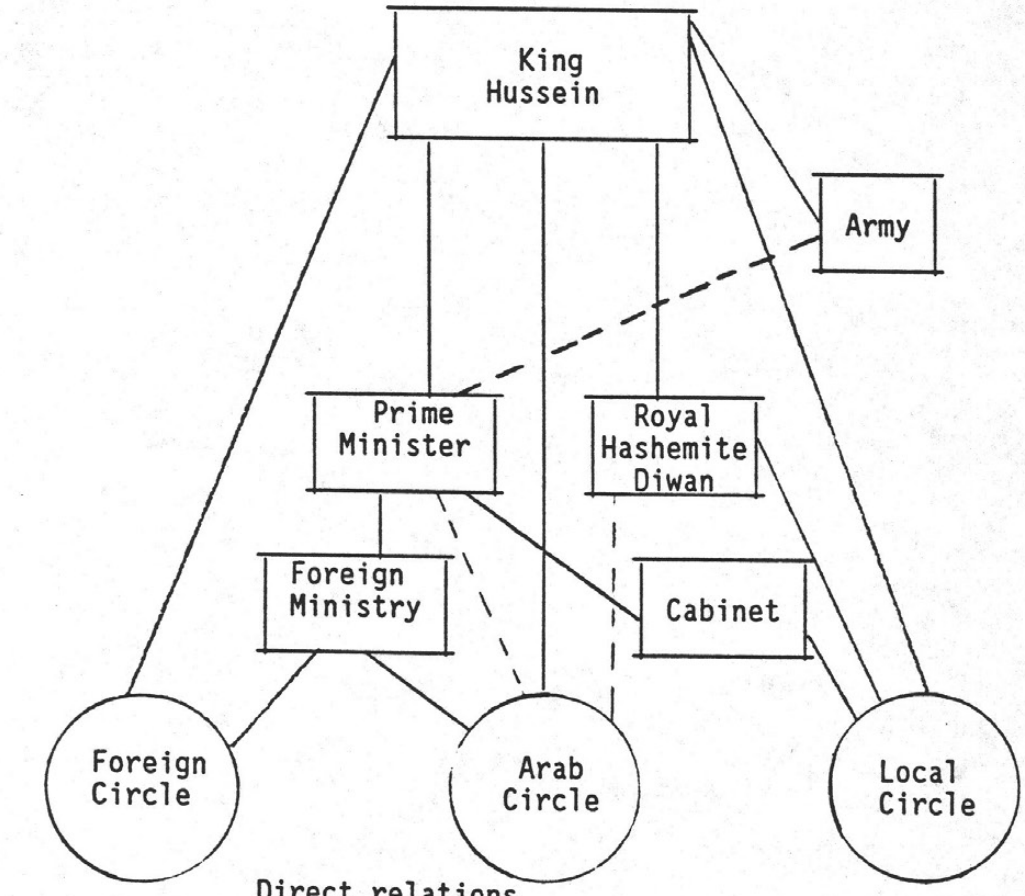
A significant contemporary difference in this stratified arrangement is the influence that a body of well educated experts and technocrats exert on the formulation of policy and decision making. This cadre of specialists does not, for the most part, hold membership in the uppermost ranks of the socio-political hierarchy, but it does have access to and is called upon by the ruling circle to provide information, expertise, and advice. This group, which permeates all branches of government, now forms a kind of second echelon elite.

King Hussein's own rulership is legitimized by his Hashemite tribal lineage traceable to the Prophet, by his adherence to the precepts of Islam, his conformance with Muslim principles of sovereignty and consultative decision making, and by the very personal style of his rule.

While the organization and workings of Jordan's government are based largely on modern principles of administration, the traditional ethos of imama permeates the roots and branches of the regime's bureaucracy, its processes, and its political dynamics. As will be seen, in no part of the government is this more true than in the water sector and its various agencies. A former member of the Jordanian government has captured something of this phenomenon in the following diagram of Jordan's decision making process.

Fig. 3.1

THE THREE CIRCLES



Source: Samir Mutami (3736)

The King clearly is the lynchpin of government, assuming direct involvement in all major sectors of his regime and in all critical issues. King Hussein personally makes all the key appointments (with advice) in his government and chooses those matters that receive his immediate and constant attention such as military and foreign affairs. He delegates responsibility and authority for overseeing other matters, but he must not be omitted from any issues that are or become important. There is no exception to this rule whenever the higher interests or survival of the state are perceived to be engaged. Although he delegates authority, the King remains the final arbiter, the ultimate decision maker. Other designated decision makers and policy planners, and their subordinates who value their posts do not forget that fact.

Hussein is every moment the King, and he rules in an intensely personal manner. King Hussein functions as a patron-ruler. The bestowal of his patronage carries not only influence, delegated power, and material rewards, but also entree into the social and political elite or a reaffirmation and strengthening of one's status within the hierarchy. The patronage that flows from the palace is in turn metered out down the line by the key members of the government, depending on one's position and relationship to the crown.

Within this system, the ruling elite exercises its influence on affairs of state in several important ways: in its advisory capacity, its management of information, and through the personal influence that particular members of the group have with the King (and in economic spheres of policy with Crown Prince Hassan). Holding a particular office does not confer automatic influence; that is determined by the nature of one's personal relationship with the King, or with those close to the throne who enjoy Hussein's personal confidence. This taxonomy of influence is replicated downward and outward throughout the government, bureaucracy, and society in general (CI;3736,3735 passim).

Thus a description of the key decision makers and agencies involved in the formulation of water policies must perforce begin with the monarchy and King Hussein.*

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* The following description of King Hussein is based essentially on a series of confidential interviews (CI) with persons who have been close to the King for several years.

The principal elements that shape all of King Hussein's policies and decisions are a blend of personal characteristics and public experiences. More than any other issue, the survival of Jordan, the dynasty, and the regime color all of the King's perceptions. Not surprisingly, King Hussein makes virtually no distinction between the interests of his monarchy, his dynasty, and Jordan. His military training and background have to a large extent framed his attitudes and world view. He is comfortable with soldiers, less so with academics and professionals. The other part of him has been formed by his early experiences under the influence of his grandfather which imbued him with a sense of self, family, and responsibility, and by his Muslim beliefs which provide him with a firm set of values. His experiences as King have made him a realist.

Altogether, King Hussein is a deeply experienced ruler, low key, modest, with a strong sense of service; he believes in and follows his instincts, confident that no one around him knows more than he or is more experienced; he is intuitively a striker of balances wherever possible in both domestic and foreign affairs. King Hussein is not rigid in his thinking, he seeks advice, is open to new ideas and persuasion, but only up to a point. He evinces a tendency toward dogmatism in regard to

restructuring Jordanian society. Otherwise, he can be both straightforward and subtle in his thoughts. Hussein is deeply religious, personally courageous but fatalistic about his safety, believes in justice, and prefers not to execute his enemies.

The King is generally seen more as a strategist than tactician (a perception with which he agrees) but one with little leverage. The assets he employs in counterbalancing the lack of power are his negotiating skills, his knowledge of other leaders and power brokers, east and west, with which the longevity of his reign has equipped him, his tenacity even in the face of discouragement and dismaying odds, and perhaps most importantly, the constant knowledge that the nation's and his own survivability depend on his leadership skills. He has used all of these talents to convince other key actors in the region - the Arab states, Israel, the U.S., and the European community - that the survival of Jordan is important to their interests.

For all these qualities, King Hussein's record for occasionally accepting bad advice, exercising poor judgment, making unfortunate appointments, and committing other mistakes, while on the whole pretty good, is not unblemished. However, the King is not a ruler who allows himself to be provoked into folly or uncalculated risk. There are very few issues, for example, over which the King would take Jordan into war with Israel. But water is potentially one of them. "[king] Hussein would ultimately fight if Israel aggrandized water to the point where Jordan's economy were so affected as to threaten survival"(CI).

King Hussein's inner circle of advisors presently consist of the Prime Minister Zaid al-Rifa'i (a schoolmate); his cousin and boyhood associate, the Chief of Staff of the armed forces General Sharif Zayd ibn Shaker; Crown Prince Hassan, for whom he has a deep fraternal devotion, and to whom he has entrusted much of Jordan's economic development, but whose influence in political matters is relatively small, and non-existent in military affairs; Marwan al-Qasim, the chief of the Royal Hashemite Divan and principal aide to the King. The holder of this post performs several important functions, among them, a mediatory service, when called upon, between the monarch and prime Minister. The Chief of the Divan has since the decade of the 60s often gone on to become prime Minister, and the latter has frequently has assumed the position of Chief of the Royal Divan(3736p12-13). Queen Nur exerts minor negative influence as regards Jordan's relations with the U.S.*

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* Interestingly, there was one outsider mentioned by an informant as a person to whom the King will listen and whose advice he sometimes takes: Margaret Thatcher, the Prime Minister of Britain.

Because the ruling circle is relatively small, and given King Hussein's style of rule, members of the cabinet and court move in and out of high offices with regularity. The effect of this circulation has not been destabilizing political infighting, though such scuffles are in plentiful evidence. In Jordan, a change of office does not necessarily mean a loss of status or of influence. Status for most of the political elite is maintained by their family and economic ties and influence by their personal connections. Often one may be out of office (usually not for long) and still advise the King or Crown Prince, or a Minister. The rotation through several positions gives the ruling political elite experience and knowledge that are beneficial to the King and the government. A number of Prime Ministers have held the post more than once. The Ministers come to understand the decision making process well and the system involves a good cross section of them in policy making. The system is stable and so is the network, because it is rare that a member of the higher spheres of government is totally discredited by the King or the actor's peers. The rules of the oligarchy and King Hussein's perferences mitigate against it.

Although professional and managerial skills are important and highly esteemed within the structure of Jordan's government, it is not organizational or administrative or technical skills that matter most to those who rule. Given the personal, oligarchical, and traditional character of the rulership, what is most valued at the highest level of government is above all, *trust*, which makes everything work, and beyond trust the ability to cope with crises and problems, and to give sound advice. These are the attributes most valued by King Hussein, Prince Hassan, and their confidents, and, in turn by the latter in their subordinates.

King Hussein imparts to his regime the personality of his leadership, which he has himself described as an ethic that goes beyond royal rank and title to "honourable service" and "responsible decision making." The King expects both the royal family and the members of his government - the policymakers - to comport with these principles. And, for the most part, they do.

But, while King Hussein and Prince Hassan play the role of exemplars, the system itself, with its underlying concepts and traditions allows room for interpretation of the rules and political maneuvering.

3.3 Decision-Making with Regard to Water

The organization and administration of the water sector reflects the general characteristics of the government. Because of the comprehensive, crosscutting nature of water issues, many government agencies are naturally engaged with water problems. This large interest has been mirrored in a strong tendency to pile up the water bureaucracy ad hoc as needs were perceived or problems arose, shifting the aegis of various water matters from ministry to ministry, or department to department. The corollary of bureaucratic proliferation has been the fragmentation of

resposibility and authority, which in turn has led to considerable duplication of effort. Also, sometimes one water unit would refuse to yield jurisdiction to another, undermining the government's attempts to improve efficiency, which usually has been equated with centralization.

For example, Law #56 1973 created the Water Supply Corporation (WSC) for the purpose of administering and distributing all domestic water supplies outside the Jordan Valley, including industry and the army. In 1977 Law #48 established the Amman Water and Sewer Authority (AWSA) and gave that agency control of all water in Amman, but without altering the responsibilities of the WSC accordingly. Furthermore, from the time of its enactment until it was absorbed by the Water Authority of Jordan (WAJ) in 1984, the WSC had still not succeeded in taking over from all municipalities control and distribution of water supplies. As long as supplying water was profitable, the municipalities would refuse to relinquish control, and in Jordan's political system, the local authorities could prevent the WSC director from forcing the issue(1791,0288).

The bureaucratic fecundity natural to Jordan's political culture has produced such a multiplicity of water related agencies that confusion has often supplanted coordination among them. In the decade of the 70s the government gave birth to more than a dozen water related units, including the NRA, JVC, WSC, JVA, and AWSA with all of their departments and directorates; and this trend continued into the 1980s. Profusion intensified redundancy and fragmentation of responsibility at the expense of efficient planning and management which led to costly mistakes. For example, the Deir Alla pumping station was built in 1985 to pump, treat, and convey up to 45mcm/yr from the EGMC to the Amman region. But, not only was the project very costly, according to World Bank experts, it was not the best alternative for supplying Amman with water. Deir Alla requires pumping water upward for about 1200 meters, operating costs are very high, and because of summer shortages in the EGMC, the pumping station is used under capacity - only 15% of full capacity in 1986. The World Bank team argued that direct pumping from the Yarmuk at the Maqarin site would have been a more cost effective plan. These prevailing bureaucratic cicumstances have consistently frustrated the government's desire for more effective, integrated water planning and more efficient management, planning and budgeting of the country's water resources(1891,0969,0247,1001,2394,3555,4092p6,3527).

These various Ministerial entities and agencies have been created sometimes by royal decrees ratified by the National Assembly, sometimes by law, or by-laws of existing laws, occasionally first by decree and then regularized by law. All laws must be signed by the King(3554). Characteristic of the growth of the water bureaucracy has been an overlapping of responsibilities and authority and duplication of tasks among the branches. Despite stated intentions, often when new agencies have been created the older ones they were intended to replace were either not absorbed or closed down.

King Hussein. The King has taken a direct hand in water issues when they have involved relations with Jordan's neighbors such as the negotiations with Israel over clearing the intake of the EGMC in 1983-84, or with Syria over Unity Dam, and also with other water-related foreign relations, e.g., the proposed "peace pipeline" from Turkey or the importation of water from Iraq, or the need for basic restructuring of the water within the government as in the creation of MOWI. Except for the most important among these matters, he usually delegates responsibility for them to the Prime Minister and expects to be kept informed and involved in decisions. He is in a general sense aware of the importance of water - the current Prime Minister encourages the King to make water a more visible Palace and public issue - but does not concern himself with day to day water administration or policies, except in those areas of his larger concerns[CI].

Crown Prince Hassan. Because the Crown Prince is the guiding hand on Jordan's economy, water takes up a large area of his interest. Overall water policy - i.e., concepts, long range goals, guidelines, and directions - falls under the purview of Prince Hassan's office within the context of his responsibility for economic development. The Prince has recruited a kind of brain trust of economic and technical experts in various fields and often seconds specialists from government agencies, the private sector, and the universities as he needs them, and he has formed an Ecomonic Planning Council to work with him. He takes input from the relevant ministries and heads of agencies and sometimes mediates between them. Day-to-day decisions and administrative policies are not Prince Hassan's responsibilities; these fall to the ministries and agencies. Prince Hassan played a large role in the creation and development of the JVA, WAJ and MOWI[CI]. He plays a very active role in domestic water policy decisions, from planning to projects, and with some foreign relations aspects as well.

As early as 1983 the Prince was involved in discussions with the Iraqis about a feasibility study for the piping of some 160 Mcm/year of water from the Euphrates and the transfer of Jordanian expertise on drip irrigation to Iraq. More recently, in late December 1987, Prince Hassan held discussions with Prime Minister Ozal of Turkey concerning the proposed water "peace pipeline", and the Prince also suggested the creation of a Turkish-Jordanian academic center based in Turkey for the study of problems of regional development[1265,3775]. The Crown Prince has also been active in promoting water research and technical studies in Jordan, and in convening conferences and seminars on water issues in the Middle East. He has taken a direct interest in various study projects pertaining to Jordan's water problems by foreign experts funded by foreign aid contracts and by the World Bank, and he has also played a role in promoting foreign assistance, including water projects, from the Gulf region where Prince Hassan is highly regarded.

The Prime Minister. Prime Minister Zaid al-Rifai takes a more than usual interest in water issues. He is highly cognizant of the vital importance of water, in part because the al-Rifai family is one of the largest agricultural landowners in the Jordan Valley(3930,CI). However, it is fair to say that the evidence indicates that his concern with water and agriculture is stimulated more by national than by personal interest.

The Prime Minister is very sensitive to the domestic and foreign political implications of Jordan's water problems. This has been a motivation for his efforts to frame water as a public issue at the level of both the Prime Minister's office and the Palace in order to reassure the public that the government gives water the highest priority and is working to solve the water shortage(CI). The Prime Minister's office keeps abreast of and coordinates water policy planning and implementation with Prince Hassan, and with the key ministries, and agencies, all of which report to the Prime Minister. The Prime Minister also initiates policies and studies which are delegated to the appropriate organizations, and his office is also involved in the foreign affairs dimension of Jordan's water issues, normally in close tandem with the Palace and, where relevant, with the Chief of Staff. Finally, as the organizational charts indicate, the Prime Minister heads several key councils, boards, and committees in the water and agricultural sectors which reinforces his central role in these matters.

But this strong centralizing tendancy in the salient offices of Jordan's government has had the effect in part of over burdening those bodies, of stretching thin the cadre of available experts, and consequently of contributing to the proliferation of administrative units, the promotion of inter-organizational rivalries, duplication of effort and manpower, hazy and overlapping delegation of responsibility, and ultimately, overall inefficiency.

For example, in 1975, the Higher Planning Committee (HPC), headed by the Prime Minister, was created with a view to associating the various Ministers more closely with the planning process. This committee not only had the same membership as the National Planning Council (NPC), but its functions were similar as well. Rather than achieve the main purpose of the HPC by an internal restructuring of the NPC, a new overlapping organ was created. The Natural Resources Authority (NRA) was empowered to issue permits for wells nationwide, but when the JVA was created in 1977, it assumed that responsibility, de facto, for the Jordan Valley, without any alteration in the original authority of the NRA, leaving the matter of who had the superseding responsibility unclear.

One of the most curious redundancies, especially the timing involved, was the creation in January 1984 of the Water Resources Directorate (WRD) within the Natural Resources Authority, at almost the same moment that the WAJ was founded with the intention of absorbing all of the water related departments of the NRA. Moreover, it was expressly stipulated that the WRD would be incorporated by WAJ as soon as the latter began to function, which was imminent. The WRD was to establish departments for studying, reviewing, monitoring, mapping, managing, etc., all aspects of surface and groundwater resources. It was to create a

computerized data base and even to run quality analysis of water samples. The creation of the WRD, on paper, effectively centralized all of its water responsibilities, many of which overlapped with those other agencies. But the assigned tasks of the WRD were also precisely those given to the WAJ by Law 34. Interestingly, the Director of WRD was Ahmad Keilani, who remained behind in the NRA and was later appointed Minister of the new Ministry of Water and Irrigation which in turn incorporated the JVA and WAJ(2281,1025).

Dr. Eng. Munther Haddadin, President of JVA. As regards the Jordan Valley, until his resignation on July 8, 1987 Munther Haddadin can be said to have come closest to being a water czar at the working level that Jordan's system would allow. He was involved in and played a key role in virtually all water policy making. As an executive body, the JVA was independent of the Council of Ministers and its president held Ministerial rank. Under Haddadin's puissant and sometimes combative leadership, and by means of broad interpretation (occasionally creative misinterpretation) of his mandate, the independence and purview of the JVA was extended until it became the most powerful influence in water policy.

Haddadin's professional influence with the Jordan Valley goes back fifteen years. He went from the computer department of the Royal Scientific Society to the old Jordan Valley Commission in 1973, made his way up to Deputy Head and then President of the JVA. He was technically competent (holding degrees in engineering and economics), a skilled political infighter, who understood how the government bureaucracy operated.

For all his talents, Haddadin's accomplishments for the JVA could not have been attained without powerful patronage. This he received from King Hussein and from Prince Hassan(CI). The King's confidence in Haddadin was such that the matter of sharing water with Israel, a critical foreign policy issue, became the exclusive domain of JVA, and Haddadin was given authority from King Hussein through the Prime Minister to negotiate with the Israelis over recurring problems that arose due to summer scarcities. Even more importantly, Haddadin was the chief Jordanian negotiator in the long and often tense exchanges with Israel over the problem of dredging out the intake of the EGMC. In these matters, Haddadin, while informing the Prime Minister and the Chief of Staff and Crown Prince reported directly to and was instructed by King Hussein(CI).

Muhammad Saleh Keilani, President of the Water Authority of Jordan (WAJ). Keilani, who also resigned on the same day as Haddadin, was the latter's principal rival at the working level and exercised almost as much influence as Haddadin over water policy, but outside the Jordan Valley and he was not concerned with regional issues, only domestic matters. Keilani, as head of WAJ also had Ministerial rank. He too was professionally talented, an able political tactician, savvy in the ways of the bureaucracy, and was long experienced in domestic water affairs. He directed the Amman Water and Sewerage Authority (AWSA) for several

years until he assumed the Presidency of WAJ in 1984. Until its absorption by WAJ in 1984, AWSA was another agency independent of the Council of Ministers, though its head reported directly to the Prime Minister.

Keilani quickly moved to establish WAJ's authority over as much of the water sector as possible with a view to centralizing the administration of water under his aegis. There is reason to believe that Keilani also aimed at subordinating (if not coopting) JVA to WAJ, and ousting Haddadin, so as to unify planning, policy, and decision making under one unit[CI] . Such a posture insured Haddadin's rivalry. Keilani also enjoyed the confidence of the King, the Crown Prince, and the Prime Minister, but in the case of the King, apparently not to the extent as that bestowed on Haddadin. Moreover, the Prime Minister sometimes found it expedient to play these actors off against one another[CI] .

3.5 Key Water Sector Policy and Planning Agencies

Prior to July 1987 there were several Ministries and autonomous agencies that shared responsibilities for various aspects of water issues, but Jordan's domestic water policy planning and implementation fell mainly within the competence of the WAJ and JVA. Although both these entities were independent, they had reference to the National Planning Council (NPC) (now the Ministry of Planning), and the Council of Ministers which is responsible for the administration of all external and internal affairs of the state[3554] . The organization of the water sector and the water sector's place within the agricultural sector before the establishment of MOWI appeared as in Figures 3.2 and 3.3.

3.5.1 The Jordan Valley Authority

For much of its autonomous existence, the JVA, and its progenitor, the Jordan Valley Commission (JVC), played the dominant role in water policy planning, decision making, and in the implementation of policy. That dominance was fashioned not only from mission and mandate, but from the competence, vision, and force of personality of its two presidents.

The JVA evolved in stages. The 1967 war with Israel effectively depopulated the Jordan Valley whose population plummeted from 60,000 to around 4,000. The Valley also suffered considerable destruction and damage to property and land. The EGMC, which was operated by the National Resources Authority (NRA) from 1965-1975, was also impaired in four separate incidents of hostility by the Israelis. When conditions in the Valley were finally stabilized in 1971 the Jordanian government proceeded with steps to resuscitate the region. Four major objectives were established: 1) an increase in domestic food production; 2) an increase in agricultural exports; 3) an increase in employment; 4) repopulation of the Jordan Valley and at the same time introduction of a program of social development.

Fig. 3.2

WATER ADMINISTRATION IN JORDAN
(Jan 1984 - Jul 1987)

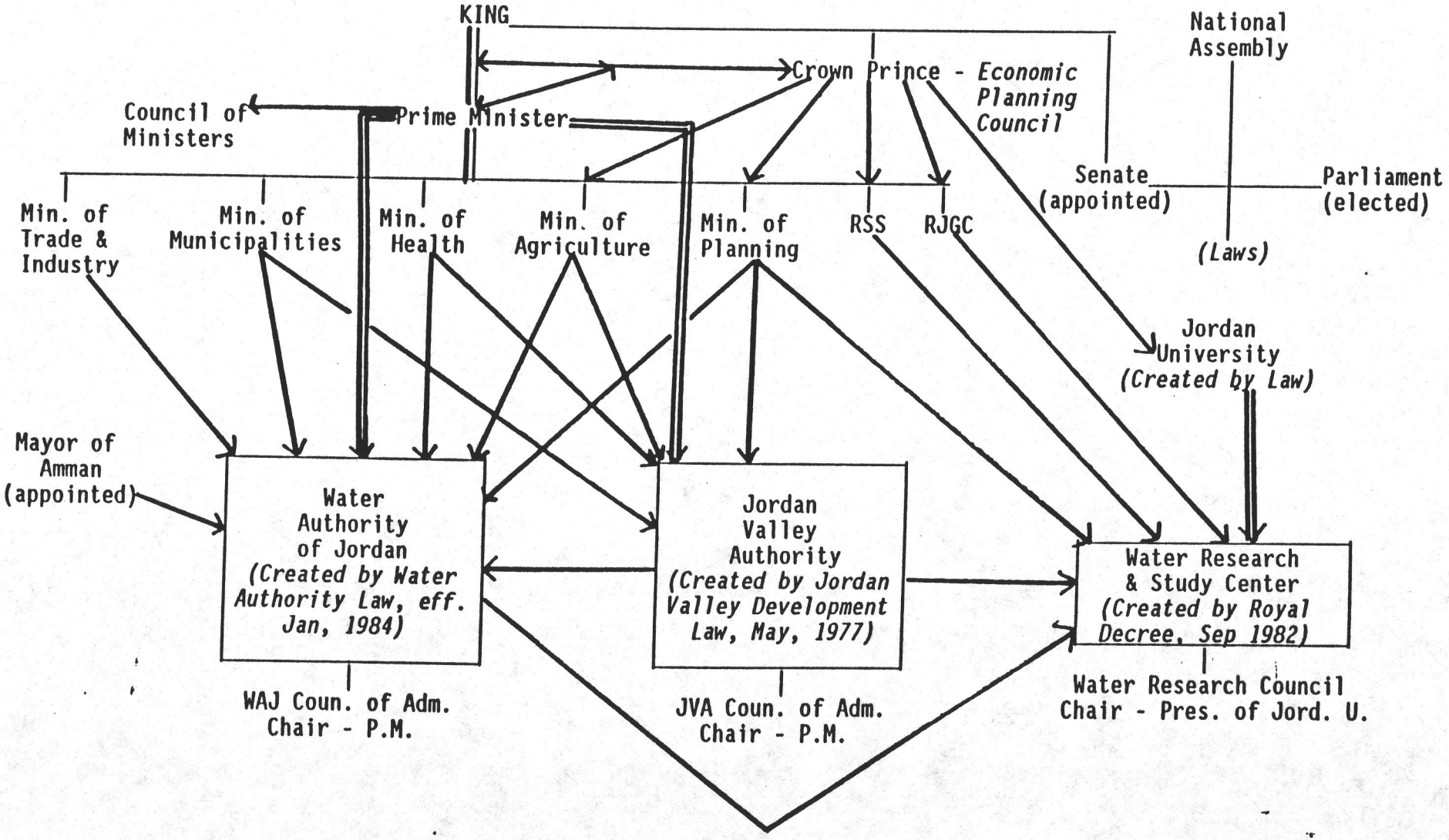
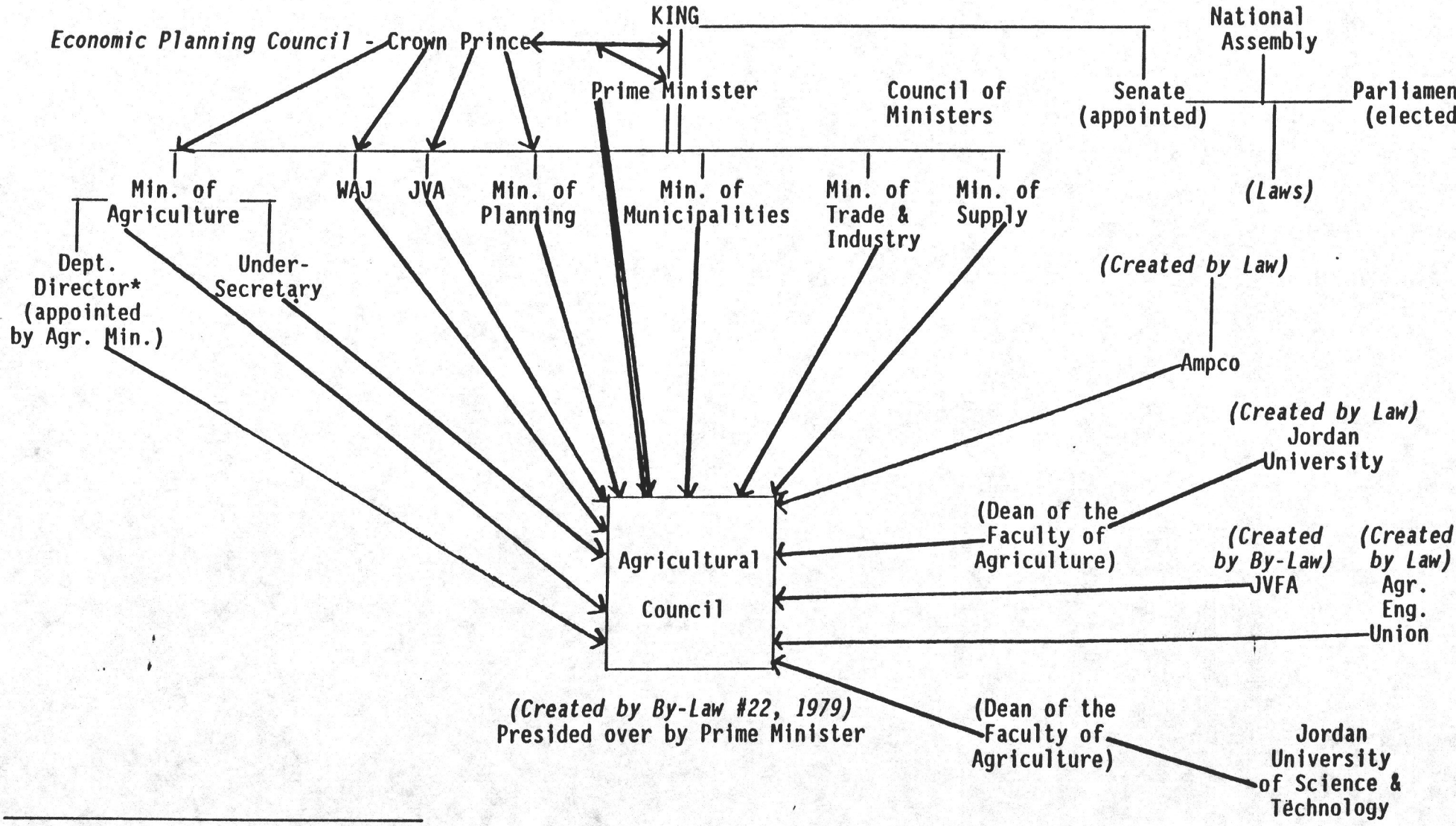


Fig. 3.3

AGRICULTURAL ADMINISTRATION IN JORDAN
(Prior to July 1987)



* Department of Economics and Planning

Toward the end of the year, the Prime Minister, Ahmad Lawzi, acting on an NPC report, created a six man Jordan Valley Committee whose function was to formulate a plan for restoring the Valley to its pre-war status and prepare a comprehensive program for the social and economic development of the Valley. The Committee was chaired by Hanna Odeh, the head of the NPC, with six members representing the NRA, the Ministry of Agriculture (MOA), Ministry of Municipal and Rural Affairs, the Jordan River and Tributaries Regional Corporation (JRTRC), and the RSS. Prince Hassan, who was closely involved in these actions, provided political support and ideas for the concept of integrated development of the Jordan Valley. The Committee's make-up reflected the complexity of dealing with water issues in the Valley and the principal agencies of government with which any new Valley water entity would have to be engaged(1791).

In June 1972, after a review by a USAID team, the Committee submitted its recommendation to the Prime Minister. Broadly, the Committee proposed the creation of a single agency with the necessary authority and means to achieve the government's objectives in the Valley. The new body would take over the task's of the various ministries and authorities that prior to 1967 had worked independently and without coordination in the Jordan Valley(145). With cabinet approval, a three man steering committee consisting of Omar Abdullah Dokhgan, the Minister of Agriculture, and chairman of the committee, Hanna Odeh, and Farki Obeid, the Budget Director. The Steering Committee's task was to supply the technical details of the full Committee's general plan. The resultant Jordan Valley Development Plan was approved in October 1972, and the Jordan Valley Commission (JVC) was established and given responsibility for carrying out the integrated development of the Valley mandated by the October plan. Omar Abdullah Dokhgan was appointed director of the JVC and Munther Haddadin was brought over from the RSS in May 1973(0028,0147).

Problems were experienced from the outset. The JVC, which was to function as a planning, financing, coordinating and supervisory group, lacked sufficient funds to perform its duties, and the other concerned organizations, the ministries, the NRA, and the Water Supply Corporation (WSC) lacked the expertise and other resources necessary for implementing the development program. Consequently, the JVC had to solve its own problems, and do the work itself, largely through foreign financial assistance. By default of other agencies, the JVC's purview expanded into construction, operations, and maintenance, including assumption of the management and operations of the EGMC(145). It was thus by force of circumstances and its ability to get things done under Dokhgan's strong leadership, that the JVC took over comprehensive independent responsibility for water issues in the Jordan Valley.

When in May 1977 the JVC was upgraded into the Jordan Valley Authority under Law 18(0288,4092p40,0147,0028), the JVC's all-encompassing scope was inherited by the Authority. Prince Hassan was an influential advocate for the creation of the JVA. The JVA absorbed all of the responsibilities, including those related to water, of the NRA, JRTRC and

the WSC. A principal motivation for bringing the JVA into existence was the government's intention to execute two major interrelated development schemes in the Valley: the Maqarin Dam and the development of the Valley south of the Dead Sea.

The JVA was established as a public autonomous unit whose general purpose was to oversee the social and economic development of the Jordan Valley. The law gave the JVA financial independence (i.e., it could raise its own money) but in practice, the Authority was funded mainly from the government's budget. The President of JVA reported directly to the Prime Minister. The Authority exercised full power in three main areas:

1) The allocation and use of all surface and ground waters within its jurisdiction. The only exception to the JVA's total control over water in the Valley was the development of ground water resources which was turned over to a geological survey group established in the early 1980s. But this group consulted with the JVA president(4236).

2) The acquisition and distribution of lands by means of expropriation with compensation or by lease(0145,3603).

3) The implementation of all Valley development programs regardless of the jurisdiction of ministries or other agencies. However, upon completion of the projects, the JVA was to turn over their operation and maintenance to the concerned units(4092,p40;4238).

In performing its tasks, the JVA acquired considerable experience in the design and construction of complex water storage facilities and irrigation systems. It also earned a reputation for technical competence.

In addition to these spheres of authority, JVA was invested with the responsibility for dealing with regional riparian issues. As stated, these include negotiating water problems with Israel, and such other matters as the feasibility of importing water from Iraq and Turkey.

The departments in the JVA most concerned with water are:

1) The Dams Directorate where responsibility for resource studies, investigations, design construction and operation and maintenance of dams were centered.

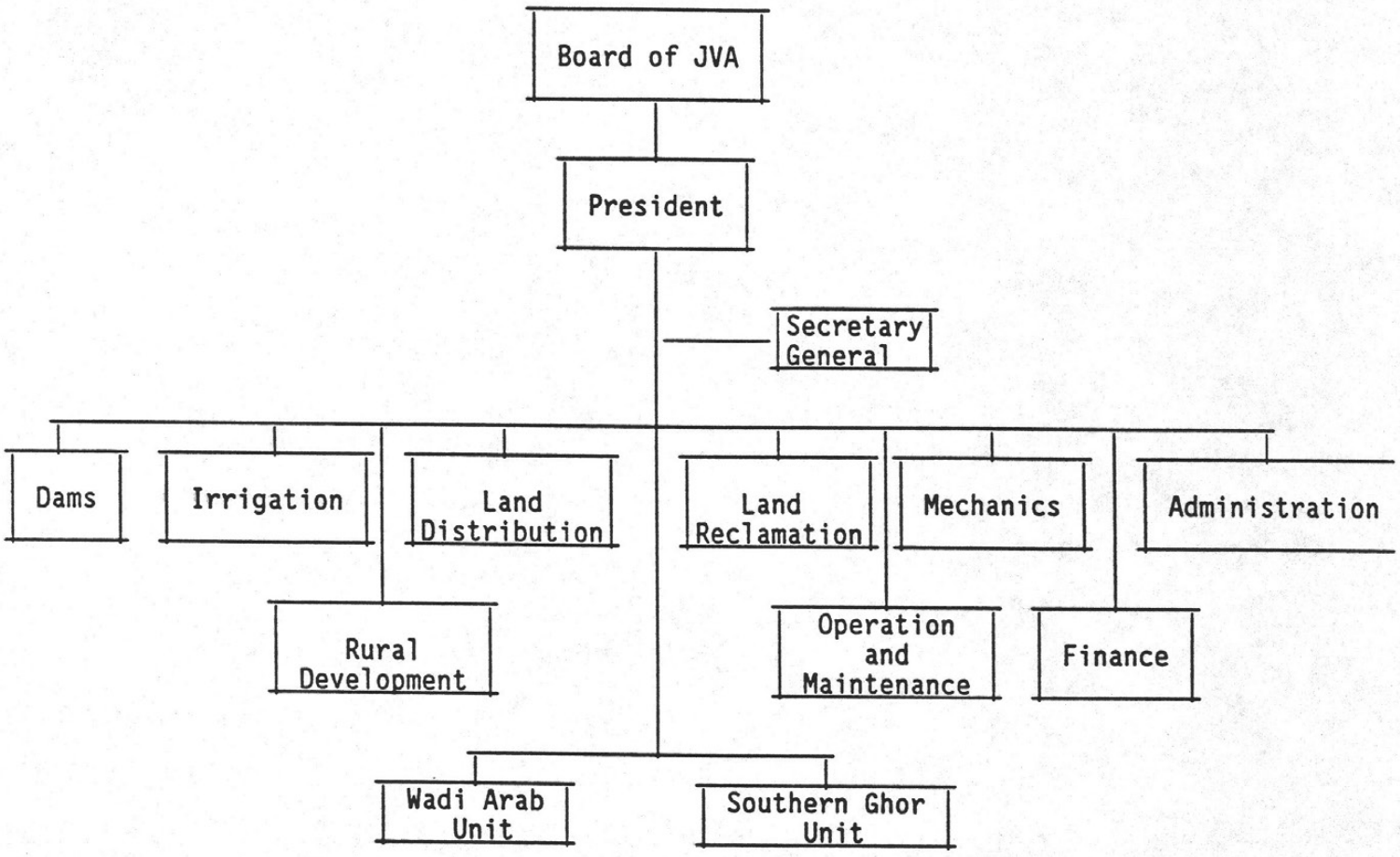
2) The Irrigation Directorate, which undertook the design and construction of irrigation and surface drainage systems.

3) The Operations and Maintenance Directorate which performed those functions for the entire system(4092.p40,1791).

Fig. 3.4

Jordan Valley Authority

ORGANIZATION CHART



source: 4092, p.98

Over time, the JVA has developed a manpower problem. The Authority staff numbers 2000, about half (975) of whom are connected with O&M, which indicates that a significant percentage of the O&M staff is supernumary. The World Bank has made a comparison between the JVA O&M staff and counterpart staffs in Morocco and Mexico.

Table 3.1
OPERATION & MAINTENANCE STAFF TO CULTIVATED AREA
JORDAN, MOROCCO, MEXICO

	Jordan Valley	Morocco		Mexico
		Pressure	Gravity	Sinaloa
Total Area (ha)	22,828	32,123	18,645	99,000
Total O&M staff (no)	975	77	121	150
Irrigated area per staff (ha)	23	416	153	660
Ditchriders (no)	188	37	39	36
Irrigated area per Ditchrider (ha)	121	868	478	2750

The comparison reveals that the O&M staff of the JVA is disproportionately large in relation to its function. The WB found that the reason for overstaffing is that certain irrigation structures are still in the main manually operated and require frequent resettings during each day(4092,p41).

Beyond JVA's specified duties within the Valley, the Authority's President has been routinely involved in most other water issues - dams, pipelines, the EGMC, etc. - outside the JV. By casting such a wide net of interest, the JVA occasionally garnered problems of jurisdiction with other government agencies concerned with water(4236;CI).

3.5.2 The Water Authority of Jordan

By the end of the 1970s and early into the 1980s population growth and distribution in Jordan had shifted significantly to the northern plateau region. Accompanying this shift was a surge in urban growth, particularly in Amman, Zarqa, and Irbid. These developments forced the authorities in Jordan to consider restructuring and integrating the organization and policy planning procedures of the water sector.

The consequences, of ill-conceived bureaucratic profluence during the 1970s reinforced the government's decision to restructure and centralize the water sector. Influential members of the water establishment began advocating the creation of a central water authority with broad powers as a solution to the problems of management and organization. Among the critics was Yousef Nimry, the director of the NRA. At a National Water Symposium convened March 19-22, 1978, Mr. Nimry reviewed the legislative and institutional framework of water management in Jordan, during which he provided an incisive discussion of the major deficiencies of the water bureaucracy. He warned:

> We will be approaching a stage where the decision makers have to deal with conflicting interests and sometimes may make conlicting decisions without having the means to define priorities and allocations of water resources properly.

Nimry argued the need for a "consolidated legislative and institutional system with a continuous and systematic feed of information so the [Master] Plan can be kept always up to date." He then proposed as a means for accompanying these reforms the creation by law of a comprehensive, authoritative, central water authority and concluded that such a law "should supersede every other law in matters related to the allocation and control of water resources ..." (0288pp237-49;1000,1001).

A task force was created in 1982 by the Prime Minister to make recommendations for ways to improve the administration and development of water resources. This study group consisted of the Ministers and directors of the relevant agencies, i.e. the Ministers of Agriculture, Planning, Municipalities and Rural Affairs, Finance, and the President of the JVA, who was represented by Munther Haddadin, who was thena Vice President. Representing AWSA was Muhammad Saleh Keilani. It is probable that the later rivalry between Haddadin and Keilani was incubated while they both served on the task force (CI-ST,7/25,26).

With a view to centralizing, integrating, and improving the effectiveness of water planning and administration, the government responded to the task forces's proposals by creating the Water Authority of Jordan (WAJ) under Law 34, April 12 1983. WAJ became operational on January 15, 1984 under the leadership of its first President, Muhammad Saleh Keilani. Like the JVA, WAJ was an autonomous entity which reported to the Prime Minister, and was also given independent financial and administrative status. The WAJ regional offices were subject to some controls by Water Councils consisting of local representatives from the public and private sector (3553,3517,4092,p.38,2281,1002,1077).

WAJ's general function was to manage water resources and the provision of water supply and sewerage services for all of Jordan. Other jurisdictions included water policy formulation, programs for the execution of policy, the protection and priority use of all water sources, the planning and implementation of national river projects, quality regulations, water treatment and purification, licensing of public and private wells for drilling and exploration, water research and training programs, and regulation of the uses of water. The law also stipulated, that all surface and groundwater, "all territorial waters and rivers" are the property of the state and use or transfer were allowed only within the provisions of this law. Mahmud Talhouni, the newly appointed Secretary General of WAJ, optomistically stated: "WAJ has taken over responsibility of all water resources in the Kingdom, we are much more flexible and have a number of options to solve problems" (1075,p3). At least that is what he thought and hoped about WAJ being in control of all water resources in Jordan at the outset of the short independent life of that Authority.

Significantly, the law qualified WAJ's comprehensive national authority in only one respect:

> The Water Authority will carry out the aforementioned functions, excluding the establishment of irrigation projects, for which the Authority provides water only. However the Authority may carry out projects pertaining to irrigation if the Council of Ministers permits it to do so(3553).

This exception pertained mainly to the Jordan Valley and the JVA.

The work of the Authority was to be supervised by a Council of Administration (also referred to as the Higher Water Council or the Board of Directors) whose members were:

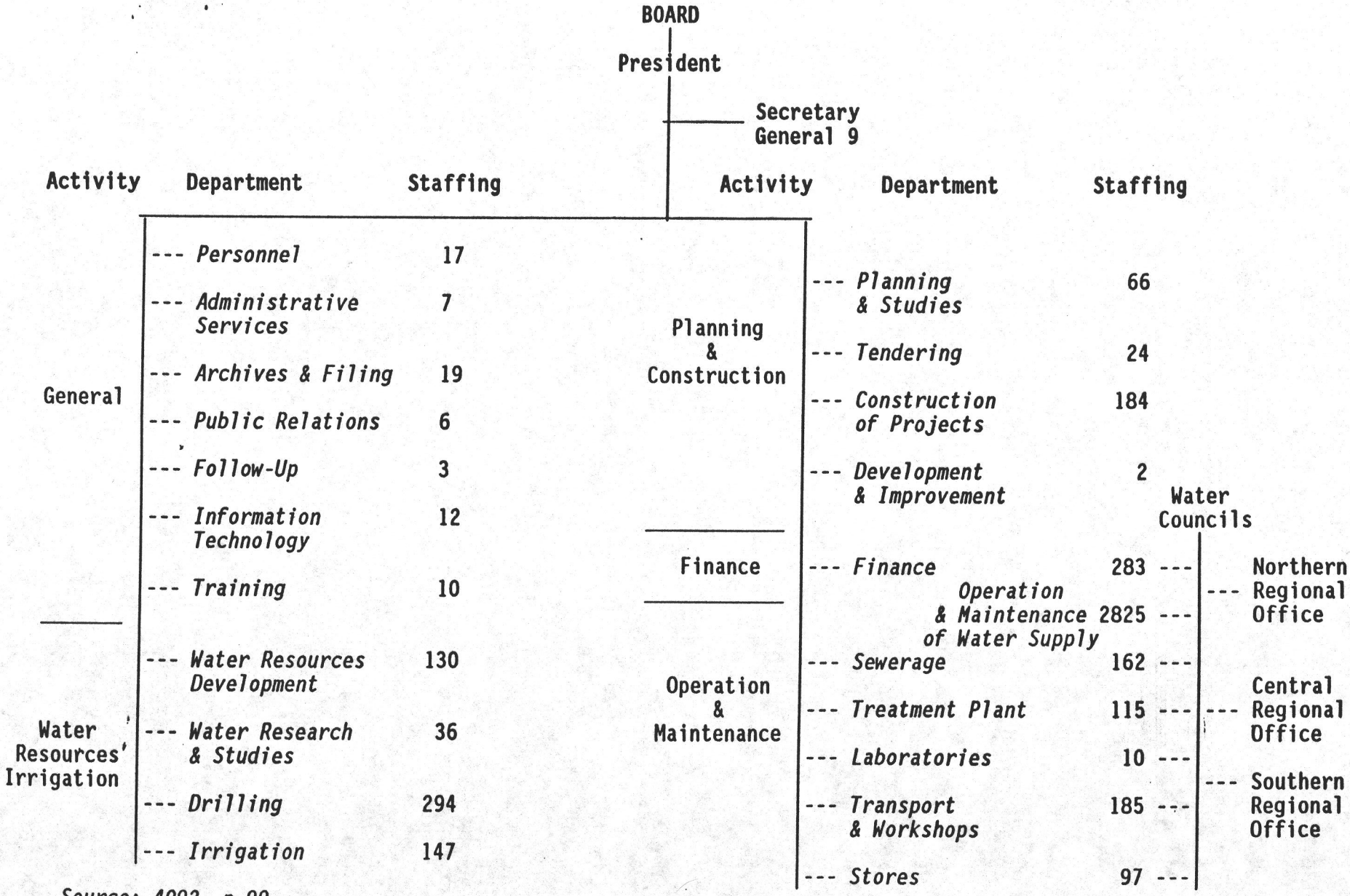
> Prime Minister (chairman)
> Minister of Agriculture
> Minister of Municipalities and Rural and Environmental Affairs
> Minister of Commerce
> Minister of Health
> Mayor of Amman
> President of WAJ
> President of National Planning Council
> President of JVA
> Secretary General of WAJ
> Two persons with appropriate expertise and experience(3553,987)

What the government intended by creating WAJ was to centralize water issues within a single agency with full authority to perform its responsibilities. WAJ incorporated the preexisting Amman Water and Sewerage Authority (AWSA), the Water Supply Corporation (WSC), the water resources branch of the National Resources Authority (NRA), the water supply department of the JVA, and the distribution networks of municipalities and villages outside Amman which included some 300 municipal water supply operations. Thus WAJ became responsible for all domestic water outside of the Jordan Valley, and for the development of the river systems which included such dams as King Talal, and for the maintenance and extension of the EGMC.

However, the Authority was given this wide purview without transferring or removing duplicate powers that had accrued to the JVA over the previous decade. In practice, the JVA retained virtually all of its water responsibilities inside and outside the Valley while excluding WAJ from jurisdiction within the Jordan Valley. In practice, WAJ's main sphere of action was in municipal water affairs and water in the southern region. This situation resulted in the existence of a large grey area where the interests of the two Authorities overlapped and sometimes clashed. Moreover, WAJ absorbed the various existing water units without a clear organizational framework of its own. By 1982 there were 22 departments reporting directly to the President of the Authority, which had a staff of 5000 to cover the entire country(3553,CI).

Relatively soon after its establishment, the organization of WAJ needed to be consolidated and simplified.

Fig. 3.5
WATER AUTHORITY OF JORDAN
Organization And Staffing



Source: 4092, p.99

3.5.3 Other Water Related Agencies Prior to 1987

JVA and WAJ were the dominant players in the water sector, but over time there evolved a myriad of other agencies and groups connected with water issues in Jordan. As Jordan's economy developed, its population grew and its cities swelled, the water demand and supply picture became increasingly complicated. The government responded by bringing into existence, often ad hoc, a large number of water related agencies, some of which have been subsumed by JVA or WAJ, while some of the established units such as the NPC, were given additional water tasks, sometimes in duplication of responsibilities assigned to the two principal bodies. Also, a number of unions and associations emerged in fields that were linked to water. Some organizations worth citing are as follows:

Agricultural Credit Corporation (ACC) - Formed in 1963 by Law #12, this agency is independent of the Council of Ministers, but the Director is selected by the Prime Minister after consulting with Council of Ministers. The ACC provides short, medium, and long-term loans to farmers, but suffers a poor repayment record (3554,3555,2182,2402).

Agricultural Engineers Union (AEU) - This organization is independent of the Council of Ministers and its leadership is elected by its members. In addition to setting professional qualifications and standards and representing its members, the AEU also provides consultants to the Ministry of Agriculture and the Prime Minister(CI). The Union or its members also issue assesments from time to time, occasionally critical of the performance of agricultural agencies(1891).

Agricultural Marketing & Processing Company (AMPCO) - The company was formed in 1985 and is a joint venture of the government which owns 70%, the Social Insurance Fund, 12.5%, the Pension Insurance Fund,12.5%, and the Agricultural Credit Corporation, 5%. AMPCO was intended to improve the marketing of Jordan's agricultural products in the domestic and foreign markets, but has so far been relatively ineffectual. Agricultural marketing remains a problem(1793,CI).

Amman Water and Sewerage Authority (AWSA) - this agency was created in 1973 by Law #19, and updated in 1977 by Law #48(0288). It was independent of the Council of Ministers, but reported to the Prime Minister. It was directed by Mohammad Saleh Keilani who became director of the WAJ(3517). Until its incorporation into WAJ in 1984, AWSA was responsible for development, transport, and distribution of domestic water in Amman(3554).

East Ghor Canal Authority (EGCA) - The Authority was established by Law #35 in 1959 for the purpose of supervising the construction, operation, and maintenance of the EGMC. In 1966 the EGCA was taken over by the Natural Resources Authority, and then it was transferred in 1975 to the JVA where it presently resides(0035,0288).

Higher Agriculture Council (HAC) - By-Law 22, 1979 created this agency. HAC meets at least once a month, with 10 members constituting a quorum(3554). Membership on the Council includes the Ministers of Planning, Trade & Industry, Supply, Municipalities, Agriculture, and the Prime Minister (who is the President of HAC). The Under-Secretary to the Minister of Agriculture, and a department director selected by the Minister of Agriculture are also represented. At present the department director on the Council is the director of the Department of Economics and Planning. Also seated on the Council are the Directors of the Agricultural Credit Corporation (ACC), the Jordanian Cooperatives Organization (JCO), the WAJ, the JVA, the Agricultural Marketing and Processing Company (AMPCO), the Agricultural Engineers Union, the Jordan Valley Farmers Association (JVFA), the Deans of Agriculture of Jordan University and Jordan University of Science and Technology (JUST), and two private sector members appointed by the Prime Minister, on recommendation of the Minister of Agriculture, for a three year term. The current private sector members, Nawat al-Saud al-Qadi and Dr. Fayiz Tarawneh, are both economic consultants to the Prime Minister(CI).

The Council formulates agricultural policy, suggests legislation, and approves development projects from the National Development Plan(3554).

Jordan University - This is a "national organization" created by Law. The Prime Minister after consulting with the Higher Education Council, selects the President, who at present is Abdul Salam Al Majali. The University houses the Water Research and Study Center and is responsible for training specialists in various branches of learning associated with water. The Dean of Agriculture is a member of HAC.

Jordan University of Science and Technology (JUST) - A recent creation, whose Dean of Agriculture sits on HAC; JUST also trains water specialists.

Jordan Valley Farmers Association (JVFA) - This organization was created by law in 1974(3554). Membership is compulsory for all farmers of irrigated areas in the Jordan Valley. It is independent of the Council of Ministers, but the Director is selected by the Prime Minister after consultation with the JVFA's Board of Directors, who are elected by the members (The current Chairman of the Board of Directors is Adel Shamaileh). The JVFA offers low-cost agricultural products (seed, fertilizer, etc.), and low-interest loans, as well as mediating disputes between farmers and the JVA(0787).

Jordanian Cooperatives Organization (JCO) - This agency is also independent of the Council of Ministers, but the Director is selected by the Prime Minister after consultation with the Council of Ministers. The JCO provides agricultural services and seasonal credit, and promotes the cooperative movement(3554,576,577).

National Planning Council (NPC) - Formerly the Jordan Development Board (established in 1952), upgraded to the Council in 1971. It was the organization primarily responsible for formulating comprehensive national policy, priorities, and resources allocation. On the Council were the Prime Minister (who also the President of the NPC), the Ministers of Finance and of Trade and Industry, the President of Jordan University, the Governor of the Central Bank, the President of the Royal Scientific Society (RSS), the President of the Chamber of Commerce Union, and two private sector members appointed by the Council of Ministers(3554). In 1984 the NPC became the Ministry of Planning(969,1142,3518).

Natural Resources Authority (NRA) - This agency is independent of the Council of Ministers, but the Director is appointed by the Prime Minister. In 1984, it was directed by Yousef al-Nimri(2353). It was founded in 1966 to coordinate the East Ghor Canal Authority, the Central Water Authority, and the Geological Survey of Mines. This was achieved by amalgamating these units within the NRA. It currently functions according to Law #12 of 1968(0288,0145). Until its water department was incorporated into the WAJ, it was responsible in cooperation with the Ministry of Agriculture for resource development and irrigation projects outside the Jordan Valley and South Ghors, as well as formulation of national water policy(3554). Its water departments, including the *Water Resources Directorate (WRD)*, have been absorbed by WAJ.

Water Research and Study Center (WRSC) - This Center was established at Jordan University in Amman by Royal Decree in September of 1982 and became operational in March of 1983. The WRSC is overseen by the Water Research Council. Membership on this council includes the Minister of Planning, the President of the JVA, the heads of the Royal Scientific Society (RSS) and the Royal Jordanian Geographic Center (RJGC), the President of the WAJ, and the President of Jordan University (who is also President of the WRSC). Also on the Council are the Deans of the University. The President of the University selects the Director of the WRSC, who also sits on the Council. At present the director is Elias Salameh(3552,2353). The WRSC provides research and training on all aspects of water development.

Water Supply Corporation (WSC) - This agency, formed in 1973 by Law #56, was directed by Yassin Al Kayed(0288,2041). Until its incorporation into WAJ in 1984, it was responsible for the development and transport of domestic water outside Amman(3554). (The distribution of this water was the responsibility of each individual municipality or village)(1791).

3.6- The Dynamics of Decisionmaking

Aside from the fact of proliferation of administrative bodies, another notable feature of this list of agencies is how many of them are independent of the Council of Ministers and report directly to the Prime Minister and whose governing bodies the Prime Minister chairs. This is illustrative of that strong tendency to centralize power and authority typical of oligarchies. In Jordan, the Prime Minister's office rather than a consultative body such as the National Assembly or the Council of

Ministers, has emerged as the political pivot of power below the Palace. The Prime Minister, whose influence on the King is evident, is himself the principle political figure through whom the King's will is accomplished.

By concentrating authority in this manner, the programs of each branch of government including the water sector reflect the agenda of the principal oligarchs, in this instance primarily the King and Prime Minister. In non-authoritarian systems of government the political and socio-economic programs of the top leadership tend to prevail too, but the well established difference is that competing agendas are permitted. In this connection, it must be borne in mind that it is the elite at both first and second echelons who control the information and expertise essential to policy formulation and the King's agenda. Consequently, despite the pyramidical organization of power, the actual process of policy and decision making is by tradition and practice consultative in all sectors of government, particularly, as will be seen, as regards water.

These factors, the King's personal style of reigning, and the prevailing consultative traditions of governing in Jordan, and dependence on the expertise of technocrats, mitigate some of the ill effects of arbitrariness and allow the system to work, on the whole, fairly well. While authoritarian controls on freedom of expression and political opposition are exerted, some channels of expression exist and a degree of dissent from some quarters is tolerated. Also, a strong sense of service and national purpose can be seen among the leaders of government. However, these larger characteristics are not guarantee against bureaucratic inefficiencies and maladministration, or the granting of favors to special interests in the private sector(4101,CI).

3.6.1 The Ministry of Water and Irrigation (MOWI)

It was apparent that when WAJ was legislated into existence by Law 34, its purpose was to make the water sector more efficient and rational in its operations by gathering within a single overarching agency all water issues. However the law failed to provide a clear delineation of powers in relation to the JVA, or to invest an overriding authority in WAJ. In consequence, two powerful water agencies emerged, with similar functions, each with its own independent authority and bureaucracy, in contention for overlapping spheres of interest and the same sources of funding. Such administrative tautologies are intrinsic to the historic conventions of government in Jordan, which are an intricate mix of tribal, Muslim, and monarchial customs, overlaid by a veneer of modern political organization.

In the circumstances, despite able leadership and good work by both units, the twin goals of efficiency and rational management of water affairs still eluded the Jordanian government. Moreover, the frustrations and tensions generated by conflicts of jurisdiction and interests led to the eruption of an open rivalry between Munther Haddadin and Muhammad Keilani which had a subversive impact on the effectiveness

of their agencies and on the objectives of the government's water policy. Both men at one time or another submitted their resignations (which were refused by the Prime Minister), and both advocated as a solution of their problem the creation of a supplanting water ministry under whose aegis all water matters would fall. Each man also maneuvered to get himself appointed as the new Minister. Since Haddadin and Keilani were very well regarded and had influence with the King, the Crown Prince, and the Prime Minister, their political infighting created an uncomfortable situation for the Palace and the Prime Minister. In the meantime, because of water shortages and associated developments, the need for improvements in the administration of water became increasingly urgent.

In 1986 King Hussein himself intervened to resolve the situation, while at the same time attacking a larger problem of government organization. The King had for some time been concerned with the proliferation of independent specialized authorities and with enhancing the effectiveness of his government. Prime Minister Rifai shared these concerns. King Hussein with the Prime Minister's backing, appointed a Royal Commission to analyze the organization of the government and to recommend ways in which the entire ministerial structure could be made to function better. King Hussein asked the commission to consider restructuring the system and within this context, to examine the desirability of creating a new water ministry and getting rid of the autonomous authorities(CI,4203).

The Commission recommended that that one of the first steps toward achieving the King's aims be the formation of a new Ministry of Water and Irrigation and the abolition of all independent water authorities by consolidating their functions within the ministry. King Hussein acknowledged his acceptance by ordering the Prime Minister to begin the process of fulfilling the Commission's recommendation. But the sensitive political quandary of the future role of Haddadin and Keilani remained.

While preparations for the new ministry were being carried forward, an incident occurred which handed the Prime Minister a solution. In the June of 1987, highly polluted water was drawn from the King Talal Dam reservoirs and sent via the EGMC to Amman to relieve a water shortage in Amman. Amman's water purification facility failed to filter out all of the pollutants causing widespread illness in the city, creating a scandal and outrage. Since both Munther Haddadin and Muhammad Keilani shared responsibility for the decision to use the Talal Dam water, both men were held accountable. The Prime Minister convened a cabinet meeting on July 1 and summoned Haddadin and Keilani to attend. Each placed the major blame on the other. The Prime Minister decided to commission the Thames Water Authority of the United Kingdom to conduct an examination of the water resources in the Jordan Valley through each season of the year, despite the fact that many similar studies had been done by both domestic and foreign experts since 1977. Obviously, this was as much a political move as a technical one. The project is presently in progress(CI,3407).

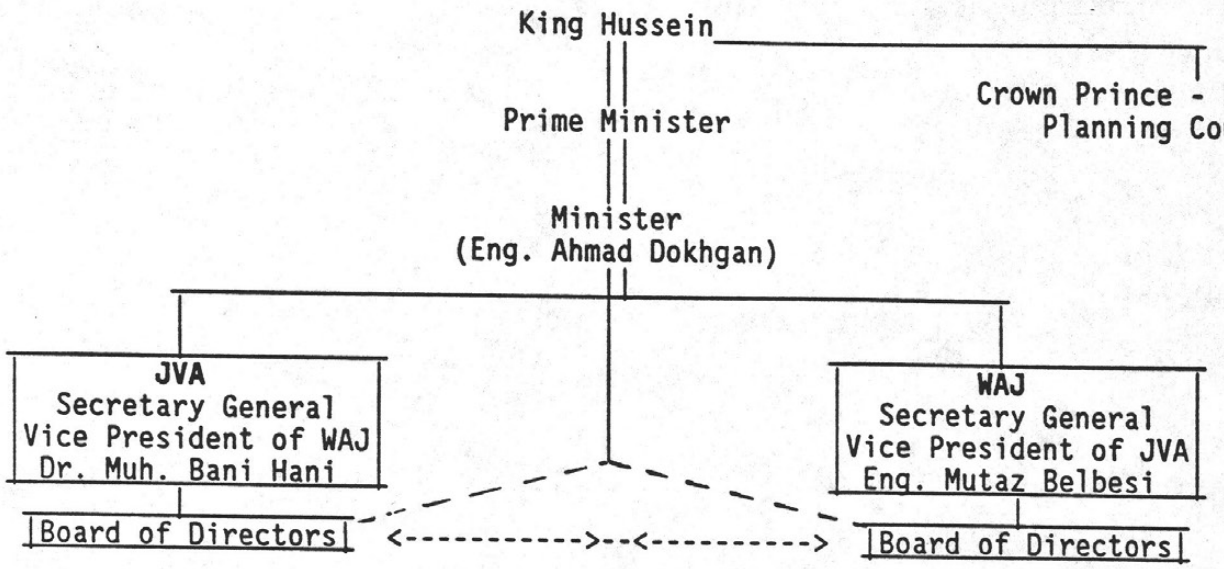
The facts of the case disallowed full exculpation of either actor, so the Prime Minister, with the support of King Hussein, simultaneously resolved the immediate issue of the pollution scandal and the problem of what to do with Haddadin and Keilani by a deft political stroke. In July, he announced the establishment of the Ministry of Water and Irrigation and at the same time asked for the resignation of Haddadin and Keilani in anticipation of ending the independence of all water authorities and turning over their responsibilities to the new Minister, Ahmad Dokhgan (a cousin of Omar Abdullah Dokhgan) whom he named in making the announcement[3407,3608,3634,CI].

This tactic relieved the King and the Prime Minister of the political problem caused by Haddadin and Keilani's conflict but they were then confronted with the larger issue of the premature birth of the new Ministry. The Prime Minister's early action cut short the full term of organizational gestation required for the Ministry to be operational when it was created. MOWI was neither fully structured nor staffed when it was brought precipitously into existence.

Consequently, a year after its creation, the ministry is still in the process of being formed and its operations are in a high state of flux. People are being moved from one city to another on short notice, officials do not know from one day to the next what and where their assignments are going to be; and at the policy making level, virtually nothing is happening because key people are still not in place, nor have all the lines of authority been clearly drawn or operational procedures laid down or clarification made of how one unit will relate to another[CI]. These issues must be sorted out before effective planning and policies can be generated. Only then will intermediate level officials be able to apply whatever new policies are formulated.

Nevertheless, some organizational progress has been made. Allowing for a certain degree of fluidity and change inherent in the evolving situation, MOWI's organization appeared in August 1988 to be as in Fig. 2.5.

Fig. 3.6
Ministry of Water and Irrigation
August 1988



JVA BOARD OF DIRECTORS:

Minister of Water & Irrigation, *President*
(Ahmad Dokhgan)
Secretary General of WAJ, *Vice-President*
(Mutaz Belbesi)
Secretary General of JVA
(Muhammad Bani-Hani)
Secretary General, Ministry of Planning
(Ziad Fareez)
Secretary General, Ministry of Agriculture
(Salem El-Lawzi)
Secretary General, Ministry of Municipal & Rural Affairs and the Environment
(Awad El-Tell)
Secretary General, Ministry of Supplies, Trade and Industry
(Mohammad El-Saqqal)
Director of the Budget

Director of Lands And Survey

Director-Agricultural Credit Corp.

Independent Member (two year term)
(Majed Sultan El-Edwan)

WAJ BOARD OF DIRECTORS:

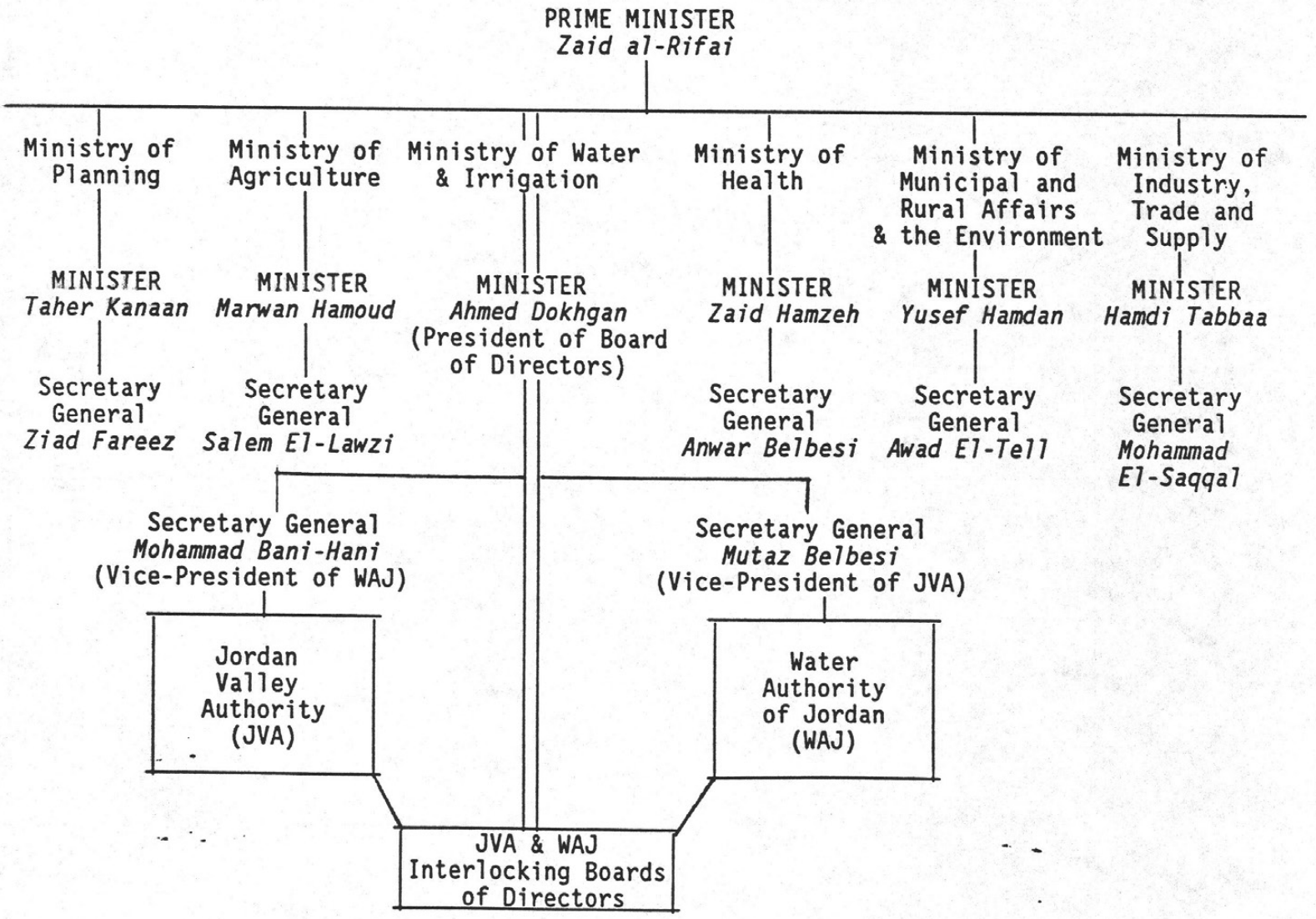
Minister of Water and Irrigation,
President
(Ahmad Dokhgan)
Secretary General of JVA,
Vice-President
(Muhammad Bani-Hani)
Secretary General of WAJ
(Mutaz Belbesi)
Secretary General, Ministry of Planning
(Ziad Fareez)
Secretary General, Ministry of Agric.
(Salem El-Lawzi)
Secretary General, Ministry of Municipal & Rural Affairs and the Environment
(Awad El-Tell)
Secretary General, Ministry of Supplies, Trade and Industry
(Mohammad El-Saqqal)
Director of the Budget

Secretary General, Ministry of Health
(NRA member)
(Anwar Belbesi)
Independent Member (two year term)
(Omar Abdullah Dokhgan)

Although JVA and WAJ are no longer autonomous and are responsible to the Minister, they carry over into MOWI their own separate bureaucracies which are as yet unchanged. Thus the total number of water related units and sub-units has not been appreciably reduced or integrated. Nor have the areas of authority and responsibility for planning, allocation, assessments, construction, O&M, etc. as yet been clearly differentiated. Presumably this process is in train.

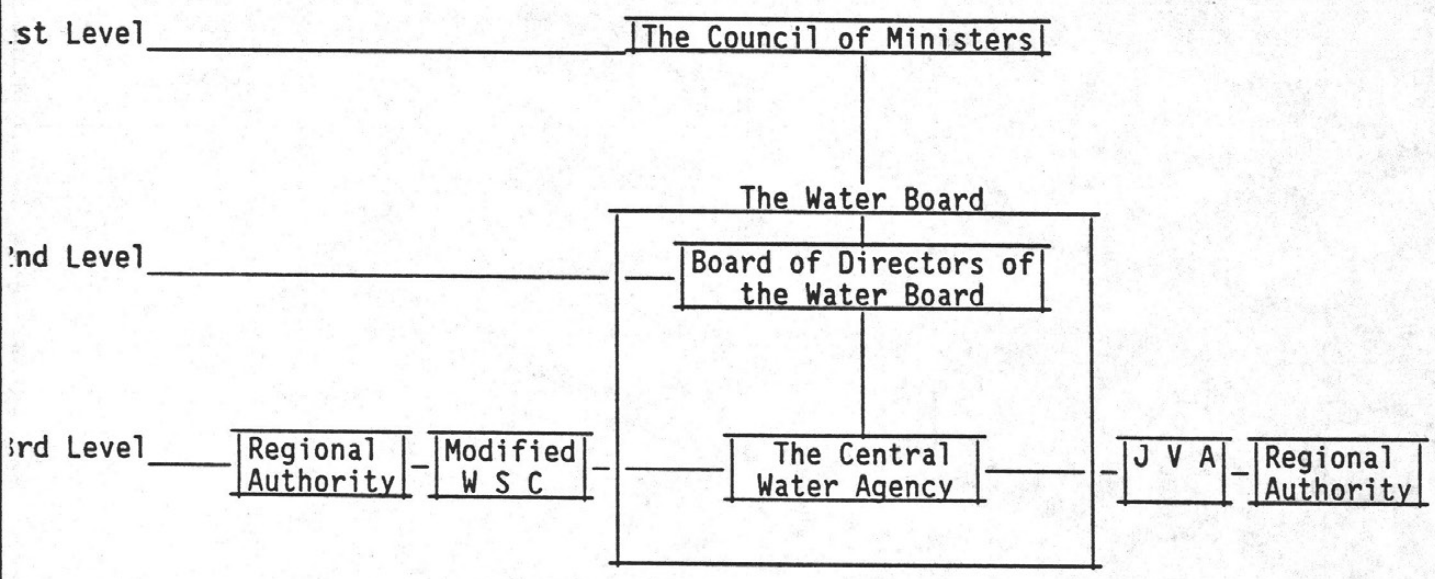
The creation of MOWI has caused the general administration of water in Jordan to be transformed (on paper) thus:

Fig 3.7
WATER ADMINISTRATION IN JORDAN
August 1988



It is interesting to compare the current structure of water administration in Jordan with the one proposed at the March 1978 National Water Symposium by Yousef Nimry who was then Director of the NRA.

Fig. 3.8

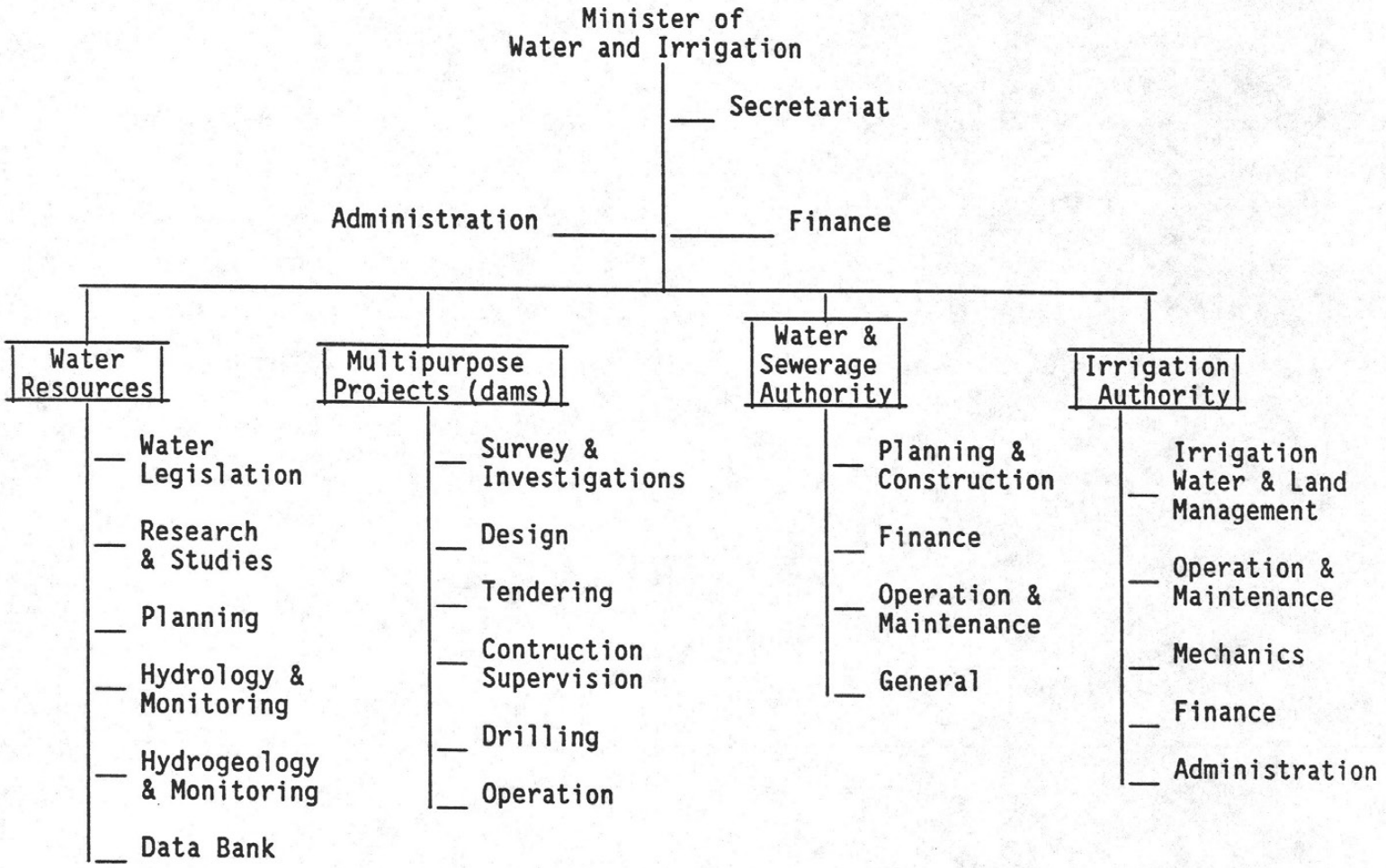


source: (288)

After an extensive study of Jordan's water sector, the World Bank, in March 1988, proposed a new structure for the organization of water agencies. Although MOWI's current table of organization does not yet reflect the proposal, Jordanian authorities are considering it. The Bank recommended centralizing the management of all water related activities under MOWI, but also suggested eliminating JVA and WAJ. Instead, the Banks's experts proposed the creation of two major departments and two non-autonomous authorities responsible to the Minister. These would be 1) a Department of Water Resources; 2) a Department of Multi-purpose Projects; 3) an Irrigation Authority; and 4) a Water and Sewerage Authority. By this arrangement, the total number of water related units would be reduced to 24, including the ministry's three purely administrative offices, all housed within MOWI. This would give the water sector a much leaner profile with a salutary reduction in red tape and more efficiency through integrated planning and discrete division of labor(4092,p.40).

Fig. 3.9

JORDAN
Water Sector Organization
Proposed Structure



source: 4092

The four units would have clear cut responsibilities and authority:

1) The Water Resources Department would be responsible for all "water resource studies, planning and allocation, for groundwater and for surface water, including water in the Jordan Valley..." The Department would determine guidelines for resource development and for the development of water legislation, quality assessments, environmental impact assessments, and surveillance of abstraction levels.

2) The Multipurpose Department would have as its function the planning, construction and operation of multipurpose projects - mainly dams - including Unity, Karmeh, Side Wadi dams, and the proposed water retention basins in Wadi Mujib. The JVA staff in the directorate of dams would be relocated in this department.

3) The Irrigation Authority would be responsible for all irrigation activities, in both the Jordan Valley and the Uplands, and would be comprised of five departments: irrigation, land and water management; operations and maintenance; mechanics; finance; administration. The Authority would oversee routine water quality for irrigation water and it would maintain strong links with the Water and Sewerage Authority as regards the re-use of effluents for irrigation.

4) The Water Sewerage Authority would be charged with "financial management and legal autonomy for water and sewerage production, distribution, sales and disposal operations, in order to ensure efficient operations on commercial principles and cost recovery." The Authority would be limited to four departments, planning and construction, operations and maintenance, finance and administration, and training. The Authority would also monitor potable and industrial water sources and efficient discharge on a daily basis(4092,p.41-42).

The Bank experts also assumed that reorganization along their proposed lines would improve the enforcement of various water regulations already legislated. Under WAJ, rules enacted in the Water Authority Law of 1983 pertaining to environmental protection and conservation of groundwater used by industry and agriculture were poorly enforced. But under the new system with these issues directly in the hands of the Minister, enforcement would be improved. Likewise, major industries that are supposed to have wastewater treatment facilities would be required to do so and the volume of abstraction of private groundwater for both industry and agriculture would be more strictly regulated.

A well organized and efficiently run MOWI would constitute a significant improvement. But whether MOWI will function with greater efficiency then the old system depends on the quality of its leadership and staff, and on the intent to which MOWI represents true reform. The new Minister, Ahmad Dokhgan, is drawn from Jordan's political elite (a cousin of Omar Abdallah Dohhgan, the former head of JVA), as an experienced member of the government with knowledge of water issues. He has served as Deputy Director of the NRA (1984), Minister of Agriculture (1985), and Minister of Transportation (1987). He is supported by many skilled members of the various water agencies and the Board of Directors of the JVA and WAJ are experienced technocrats and Ministers. The talent clearly exists for MOWI to become an effective ministry that could operate along new lines.

The putative organization of MOWI makes clear the government's intention to improve its management of the water sector by centralizing, integrating, and, if possible, trimming down the myriad water units that existed under the old system. The World Bank's proposed reorganization obviously echoes that purpose. But the mere establishment of MOWI does not confer automatic achievementof the government's water management goals.

3.6.2 Role of the Top Political Leadership

Activities within and pertaining to the water sector, whether planning, budgeting, or specific projects, are almost always generated by the operating bodies, principally the JVA and WAJ, but also by the Ministries or other agencies with water related responsibilities. Initiatives can come from the higher political levels too, most often from Prince Hassan's office if the matter is economic or from the Prime Minister if it is political, with the King's involvement if the Prime Minister judges the issue to be of sufficient weight or if there is a military or international dimension attached.

However, except for Prince Hassan, the interest of the top political leadership in water affairs is, by and large, activated by technical and political subordinates in the water sector. Because the water sector is so centralized, local and provincial authorities play only a minor role in policy and decision making. Governors and mayors monitor water in their towns and districts and inform the Ministers and authorities of problems, lobby for improvements or for special privileges for local industry or important land holders, facilitate projects and other ministerial activities in their areas, and occasionally, in times of crisis, meet together to lobby the government (1079,1080,1308,145).

The higher political leadership sets or approves policies for the water sector, decides on where to slot water into the larger context of national and international economic and political priorities, is responsible for the enactment of appropriate legislation, negotiates foreign financial assistance, approves projects and their budgets, makes decisions regarding issues of international cooperation or conflict over water, and in general, is involved in policy formulation and decisions for key water affairs. These responsibilities of the top leadership apply to all branches of government and are performed with considerable input from the intermediate and lower ranks of the administration. Indeed, the traditional consultative political processes of Jordan have largely determined the administrative structure of the government, with the main lines of authority supported, by many substructures, pyramiding upward to a single apex of power.

3.6.3 The Policymaking Process

Water policy making in Jordan occurs at two levels. One is conceptual, strategic and long term, the other is short term, tactical, need-focussed, and centers on projects, budgets, and development targets. Larger conceptual planning is done by Prince Hassan (and his Economic Council), and the Ministry of Planning (MOP) with very heavy involvement by JVA and WAJ and the Prime Minister's office. The product is usually a set of national goals and policy guidelines for achieving them. These planners coordinate (but not always effectively) among themselves(CI).

Shorter-run policy formulation is based in the responsible ministries and water agencies, principally, as usual, in JVA and WAJ, coordinated by the Prime Minister's Office, and prepared within the framework of the government's five year economic development plans. Prince Hassan's office is also a part of this process. But here, the Prime Minister is the key link among the various organizations. While the five year plans review and assess past performance, identify priorities and establish overall goals, it is the water-related units of government that must provide the technical, budgetary and operational details on an annual basis. Domestic and regional economic and political conditions, which in the Middle East are in a constant state of flux, almost always force changes in these yearly plans(CI).

Water sector policy planning is accomplished in stages and involves a large number of sectors. The usual practice is for the Prime Minister to appoint an ad hoc Planning and Policy Committee (PPC) which represents all of the major constituencies of the water sector (See Water Administration in Jordan, Fig. 3.2 p. 68a) about six or eight months prior to the submission date for the next five year plan. Each water unit is instructed to submit to the committee a report of its past five year performance, its current and projected five year needs, including budget, and a plan of implementation. The PPC and its staff of specialists studies the proposals in regard to their technical and financial feasibility, their relevance to the established national development targets, their priority ranking, and whether they duplicate or counteract in any way other plans, and then alterations that are considered necessary are made. This procedure is replicated throughout all the branches of government(CI).

When the water sector plans have been reviewed and collected, they are sent to a plenary of all similar PPCs from other parts of the government, where the Prime Minister, Prince Hassan, and the Ministers (including the Minister of Finance) are also participants. Here, the country's political leaders, with the Prime Minister and Prince Hassan at the fore construct and shape policy from the bricks and mortar of the individual reports. Here, at this policy building site, all of the dynamics of Jordan's political culture are played out. But the key actors arrive having already prepared considerable groundwork with the Prime Minister, the Crown Prince, and the King(CI).

The five year plan that emerges from this process, a product of many compromises, trade-offs, and emendations, always reflecting the main agenda of the Prime Minister and the King, is sent to the National Assembly for approval and ratification. With that step completed, the plan is published and implementation begins(CI).

However, not all projects in the plan are actually carried out. Whether they are executed depends on the availability of funds and the evolving political situation. Moreover, even as implementation plans go forward, projects are subject to change or cancellation or replacement by new projects. If a new enterprise is initiated it does not have to undergo all of the stages of preparation and review as the original five year plan; it is enough for the appropriate Ministers and Prime Minister to give approval. Such changes are common in the water sector(4203,CI).

Where water is concerned, planning and policy are significantly influenced by the government's heavy reliance on foreign aid and expertise for much of its water sector development, particularly as regards large infrastructure projects such as Unity Dam. This dependency provides foreign governments with an important channel of influence in Jordan's economic and political affairs.

Although policy decisions on the use of water lies in the hands of government agencies, they are, in fact, quite dependent on foreign capital and consulting for much of their planning and work. Foreign consultants particularly exert a disproportionately large influence on the water sector. They are usually representatives from both the public and private sectors of the government giving the money, or of international bodies such as the United Nations or World Bank. (Arab governments that contribute financial aid to Jordan, who themselves need foreign expertise, rarely provide consultants)(4203,CI).

Jordan seeks help from various foreign sources for dealing with its water problem. USAID contributed funds and expertise to the construction of the EGMC, the feasibility study of the Maqarin Dam, and to the construction of the Dier Alla pumping project, among others; the German Agency for Technical Cooperation (GTZ) of the German Federal Republic prepared the National Water Master Plan of 1977; Harza Engineering of Chicago, Illinois did pioneering work in the 1950s on the EGMC, and has continued to be a principal hydroengineering consultant for Jordan ever since, currently preparing a feasibility study for the Unity Dam; Howard Humphries and Sons, is a British consulting engineering firm that prepared a large 1978 report on water use strategy in Northern Jordan; and the World Bank in March 1988 prepared an assessment of Jordan's water resources, and is following up with a similar report on the agriculture sector; and most recently, in June 1988 the government awarded a contract for drilling the 800 meter Unity Dam diversion tunnel (for channeling the water away from the dam site during construction), to an interesting consortium which reflects Jordan's partnership with Syria and its need for western aid. The contract combines Impregilo, an Italian company, with Syria's Mount Kassioun Company, and Jordan's Consolidated Contractors Company(4222,4092,1741,2810).

One characteristic of Jordan's foreign assistance programs is repetition of studies prepared for various projects when more than one foreign agency is involved over time. As each foreign group becomes engaged, it usually proposes or insists on its own feasibility or environmental study, or as already noted, the government for a variety of political and economic reasons, sometimes no more significant than the requirement by a foreign financial donor. When a study is commissioned for a certain water supply or for developing a strategy for the utilization of water in a part of Jordan, the foreign experts submit their reports to the contracting agency, e.g. WAJ or JVA. Because of an inadequate supply of domestic specialists who would be expected to review and evaluate the reports, and offer alternatives, the great majority of the studies are accepted as submitted and slated for implementation. If the implementation is given over to other foreign consultants, they often find fault with the original study and recommend a new one: hence the duplication of effort(C1,1791).

Frequently, foreign financial assistance for water projects are insufficient, mostly for operational costs. This appears to be particularly the case for capital costs of domestic and wastewater projects, where the problem is compounded by the government's failure to generate enough revenue from these projects to make up the deficit. JVA and WAJ projects are financed out of foreign aid and loans and also from government budgets, which sometimes are less than capital costs. Moreover, as already demonstrated, the project revenues usually do not meet the O&M expenditures either. These shortfalls must be made up out of the government's budget. These circumstances have the compounded negative effect of placing great strains on the economy and making the government increasingly dependent on foreign assistance, with its consequent political implications(4203).

3.7 Assessment

If the Jordanian government's determination to reform and improve the operation of the water sector is to produce the intended results, the authorities must adopt a more effective organizational plan along the lines of the World Bank scheme which simplifies and clarifies the lines of authority and responsibility. However, such a step would require the dissolution of the JVA and the WAJ units as presently constituted. But because of the circumstances in which MOWI was created, and for other political reasons, among them a sweeping reallocation of manpower and authority that the change would entail, it is improbable that this reform will be attempted soon. Until it is, in some form, the effeciency inherent in the concept of MOWI is unlikely to be realized, and yet another reorganization within the water sector appears to be inevitable in the future.

However, it must also be borne in mind that whatever final shape the new Ministry takes, it will function within the received conventions of Jordan's governing process and be led by men who are committed to the traditional rules of political behavior. While it is highly unlikely that the ruling elite will alter this system in any radical way, it has shown itself to be, within limits, adaptable to changing needs and conditions.

Unless the government takes effective steps soon to insure integrated balanced planning and decision making - which must include the creation of a flexible integrated water resources planning model - particularly as regards the allocation of water resources among competing sectors, and unless simultaneous steps are taken to improve field efficiency and reduce water loss while exploiting available resources to the utmost, Jordan will be unable to escape a water crisis of major proportions within a decade, perhaps within the next five or six years if drought conditions worsen.

Chapter 4
INTERNAL POLITICS OF WATER POLICY MAKING

4.1 Description and Evolution Of Current Water Use Policy

Presently, Jordan's publicly stated official national water use policy, which in some respects is more a general statement of intentions, can be summarized by its principle features:

1) Improved efficiency and balance in the management, distribution, and application of water resources.

2) Increased production of water from established and new water stocks.

3) Increased conservation through the application of new technologies and techniques in water use in agriculture and M&I through repair of current systems of water conveyance, by supplying all communities with piped water and safe sewerage systems, and through better O&M.

4) Scheduling of water charges at a level sufficient to recover full O&M costs and a significant portion of capital investments. This includes selected reductions or cancellations of subsidies.

5) The maximal use of treated wastewater from all sources as return flow for irrigation.

6) Giving first priority in allocation to domestic use.

7) Giving preference whenever possible to the use of groundwater rather than surface water for domestic purposes.

8) If possible, the water rights of all parties should not be violated.

9) If functioning projects in both the agricultural and industrial sectors, whether public or private, should have their source of water supply diverted in part or wholly for other uses, including domestic purposes, then it is the government's policy to try to provide sufficient compensation to prevent harm or suffering.[CI]

These observations may be made about Jordan's present water use policies:

1) They have been shaped by the historical evolution of the unstable ratio between available water resources and changing needs. Significantly, effective population planning aimed at reducing the rate

of growth is absent from the official water use policy statement, probably because the government is not taking vigorous action on this critical front.

2) Most of these policies which have been embodied in various five year plans are essentially general statements by Jordanian authorities of the government's intentions regarding water issues, and an indication of the direction in which the government hopes to proceed on water policy.

3) Only some of these policies will be fulfilled and not necessarily in the way or within the time frame implied by the stated policy. For example, politically sensitive issues such as subsidies for water and agriculture will be resisted by farmers groups who, as will be seen, constitute a very effective lobby.

The unchanging determinants of national water policy for any nation are supply, demand, and quality. These factors in turn are reciprocal functions of population growth and distribution and economic development. Within the frame of these determinants, water policy for Jordan has been over the past three decades formed chiefly around agriculture, the largest consumer of water. Because the Jordan Valley has had the greatest development prospects along with potential for the largest pay off from irrigation projects, agricultural development in Jordan has focussed on the Valley(0028,3517p10,0867,2068,1813). From the time that the EGMC came on line in the early 1960s through the creation of the JVC and the JVA in the 1970s the government's water policies have given increasing priority to the socioeconomic development of the Jordan Valley. Successive Valley plans, 1972-75 and 1975-82 envisioned trebling the irrigated area from 2,000 ha to 36,000 ha. The Maqarin Dam alone was expected to provide water for 15,000 ha, or 42% of the total irrigable land.

As part of carrying out these plans, the government amended the basic land distribution law of 1962 (Law 31) three times. That law established the minimum farm size in the Jordan Valley at 30 dunums of irrigable land and the maximum allotment at 200 dunums (1 dunum = 0.1 ha = 0.247 acres), and it set an order of priority for distribution: 1) farmers who own and cultivate their land; 2) full time professional farmers in the EGMC project area; 3) other professional farmers living in the same district which included residents outside the canal project; 4) professional farmers living in other parts of the country; 5) landless farmers who rent or sharecrop farms in the canal area(3536p1-2,0145p88-89,0969p127).

The later laws of 1968 and 1973 raised the minimum allotment to 40 dunums but maintained the order of priority distribution. The 1977 law elevated the landless farmers to the second level of priority and dropped absentee landowners, whether living in other parts of the country or abroad, into the last category. At the same time, the law allowed each member of a family to be allocated a separate farm unit; previously, a family had been treated collectively as a single landowner. This amendment enabled some wealthy and influential families to retain or to build up large agricultural land holdings in the Valley. These laws

affected water use policies because of the differences in the ways large wealthy farms and small single family allotments operated in terms of cropping patterns, the application of technology, on-farm efficiency, and amount of water used, bearing in mind that the cost of water in the Valley has been subsidized de facto for all farmers. Also during this period the government created in 1974 the Jordan Valley Farmers' Association as an instrument for development of the valley's irrigated areas making membership compulsory(3555p483;0145p89-90;3536p1-2).

Based on the assumption that all of the hydrological infrastructure projects would be completed by 1982, and that almost the whole Valley would be converted to sprinkler systems by then, the government optimistically projected crop production in constant prices would increase by 300%, and that GDP per capita would rise by 123% in the Valley(3555,0969,0145). However, in the decade from 1975 to 1985 a combination of factors, within and outside Jordan, came into play militating against the achievement of the governments projections. Several of the development projects were not completed (most notably the Maqarin Dam); the manpower required for the success of the plan -- a doubling of the Valley population between 1975-1982 -- did not materialize; a labor outflow generated by a boom in the Gulf which also sparked a rapid expansion in the country's industrial and services sectors; an internal rural to urban migration; and a dramatic leap in the rate of population growth.

Most of these changes resulted in a hefty rise in demand for water by the M&I sector. Complicating these changes were recurrent droughts in the 70s and 80s, confronting Jordanians policy makers with ever more troublesome decisions about allocating diminishing (and often rationed) water resources between agriculture and M&I. This task of Jordan's decision makers was rendered even more difficult by the lack of adequate information and expertise, and a dependence on foreign resources and consultants. These challenges, compounded by the external problem of Israel's occupation of the West Bank and the Golan Heights, the consequent loss of Jordan River water and the failure to construct the Maqarin Dam, have led to the current policy complication of balancing need and allocation between agriculture and M&I.

It is unlikely that the inherent goals of these policies will be satisfied in full measure. Jordan still lacks adequate expertise and data, is still heavily dependent on foreign financial aid and professional assistance for the execution of water policy. Nor has the country yet solved the political problems of effective organization of the water sector or the efficient management and delivery of water resources.

On the other hand, Jordan does possess the native talent albeit in short supply, at least to stave off disaster if not to solve all of its water problems, a stable government with strong dedicated leadership that can make tough decisions, and a capacity for adapting to changing conditions and regional crises over which the government often has little control.

What Jordan least possesses is sufficient expedients to contend with a prolonged severe drought or loss of significant portions of its already restricted water resources owing to climatic or political causes. Neither would its immediate neighbors, Israel and Syria be able to withstand similar prolonged water crises. In such a circumstance, unless the issue were to be settled by warfare, water policy would have to focus on regional solutions involving the sharing of available water stocks. But regional approaches to water issues requires satisfactory resolution of the outstanding political problems, one of which is the very absence of multilateral policies among the key actors for water resources sharing, despite the fact that they already mutually suffer the same drought and the same general scarcity with attendant adversities and latent calamities.

4.2 Implementation of Regulations and Statutes

The same bureaucratic density, ad hoc measures, maladministration, and inter-agency rivalries that have frustrated efforts at making the water sector more efficient and cost effective, have also impeded full application of water regulations during the last three decades. Special interest groups within the government and in the private sector have succeeded in avoiding the intentions and restrictions of law with harmful consequences to Jordan's water resources. Illustrations abound.

The prohibition of further drilling for water in specified areas has not been effectively enforced. Private sector actors with sufficient political and financial influence have consistently been able to receive licences for drilling wells and extracting water in the proscribed regions. Moreover, because of meter cheating and poor monitoring, as much unregulated water as desired could be withdrawn from the wells. The byelaws and regulations of both the JVA and WAJ strictly forbid such practices and lay down specific quantities of water that can be taken from a given source, but these rules have been constantly violated with impunity. The upshot during the last 25 or so years has been serious depletion of several important groundwater sources: Jafr basin and aquifer (130 km NE of Aqaba); Dhuleil basin and aquifer (40 km NE of Amman); more recently, increasing illegal extractions are being made from Azraq Oasis (which sits on top of an aquifer shared by Syria and is 100 km east of Amman) and Qa Disi-Mudawara aquifer in the south. By and large, the private sector takes as much water as it likes[CI]

There are clear statutes requiring Jordan's industries to remove industrial wastes from their water before discharging it into the environment. Each plant is required to have a facility for doing so, and indeed almost all manufacturing plants do have collection pools for treating their wastewater. However, there is widespread circumvention of this law. Many industrial establishments discharge the untreated water into sewers and nearby wadis in order to reduce costs, but with little regard for the dangerous consequences of their acts[CI].

Many farmers in the uplands use domestic water sources for irrigating their crops, despite government proscriptions against the practice. These farmers tap into the piped domestic water before it reaches the meter and siphon off what then becomes a cost free source of fresh water to soak their crops. Local government officials are aware of the practice, but have been neither vigorous nor effective in taking corrective measures. They themselves are often part of the local society, related to the cheaters and therefore inclined toward turning a blind or tolerant eye; or they feel that the central government is not providing enough support. While Amman does not condone these illegalities, the authorities are susceptible to local influence and also weigh the political factors involved[CI].

The Jordanian government is highly sensitive to the need for avoiding any actions that would inflame an important segment of the population. In general, King Hussein's government has always been willing to pay a certain economic price for the sake of maintaining domestic tranquility. But where groundwater, which is a vital and largely non renewable resource, is concerned, the price being paid for leniency is already too high and the government is going to have to take remedial action soon, whatever the political fallout.

4.3 Special Interest Groups

The main reasons various special interests in Jordan, principally agriculture, manufacturing, and mining, may seemingly flout the law with impunity, are to be found in the structure and conventions of Jordan's society which are accurately mirrored in its government. Culturally, Jordan is an amalgam of tribal traditions and a modern well-educated middle class. Jordanian society is still, in many key ways, deeply influenced by its tribal past, influences that are reinforced by Muslim concepts of leadership and community. Jordanian society is family oriented and hierarchal, and among Jordanians notions of family loyalty, honor, and shame are strongly held. Jordan is a small country where, in part because of those same tribal traditions, access to the corridors of power is relatively easy and count for something even when once or twice removed. In Jordan, what matters is who one knows in strategic positions, or can get to through others.

In this setting, Jordanians, like all Middle Eastern societies, extensively practice wasta (intermediation), a kind of trade in influence (of any sort) for acts of favor, at all levels of society. Generally speaking every wasta given requires (unspoken) an equal or stronger wasta in return at a time and in a form the giver decides. The system can become very subtle and complex, and sometimes the stakes can be high. (In a socio-political sense, wasta can be designated as the true "informal economy" of every Middle Eastern nation.)

It is accepted behavior to achieve goals or desires through networks of family and friends by trading wastas (favors or influence). This attitude prevails at all strata of society and government, hence the tendency to tolerate actions by interest groups or individuals to gain

special interests. These acts may dismay some and frustrate others in various positions of responsibility, but they are not viewed with powerful disapprobation (unless excessively abused). The general attitude is, simply, that is how the system has always worked. (It is recognized here that there is scarcely a human society where wasta is not practiced in one form or another peculiar to the cultural traditions of that society).

In Jordan, in some instances, it is not even necessary for officials to know that their power or influence is being used. Often, at a local level, knowledge alone of one's powerful connection in high places, coupled with an assumption that a putative favor would be granted from above, is enough to produce the desired result. Thus, occasionally government officials may not even be aware of special privileges dispensed in their name. However, in the final analysis, Jordan can ill afford widespread wasteful privileges among special interest groups in the water sector.

For example, starting around 1985-86 the government began to acquiesce to private sector farmer demands for water from the Qa Disi aquifer in southern Jordan near the Saudi border. Most of these farmers are bedouin tribes. Several studies - e.g. Humphries 1986, World Bank 1988, Thames Water Authority 1988, AMER, 1988 - have established that source to be 30,000 year old fossil water of top quality for drinking purposes. Moreover, Qa Disi represents Jordan's primary strategic water reserve. Despite the governments's knowledge of these facts, and negative recommendations by its own and foreign experts, the authorities nevertheless leased the water and land requested. The farmers persuaded the government to use the water for growing wheat, arguing that indigenous wheat crops would meet much of the country's demand and cut import costs while at the same time contributing to Jordan's food security. Presently, the government has decided that the decision to lease the Qa Disi water was an error, but the agreement signed between the government and the private sector agricultural group requires payment on the order of $30 million compensation if the leasing agreement is broken(CI).

Technically, well drilling licenses are issued only by WAJ for a specific volume of water extraction each year. The restricted areas constitute more than 50% of northern Jordan. However, these regulations are often ignored or circumvented by farmers and industrialists who have influence in government. Furthermore, although WAJ was given the licensing responsibility, it was not accorded sufficient means to enforce the rules. The licenses are issued by a central department in WAJ which lacks the means for implementing regulations in the field(CI,1791p15,4092p43).

In general, the private agricultural interests, led by large landholders among prominent families, and financiers who speculate in agriculture, manage to have government irrigation projects implemented more quickly than projects intended to supply water for M&I, even though the government has for several years stated its intention of leveling off the amount of water being taken for irrigation(1000). These agricultural

lobbying groups achieve their success by focussing their efforts on the government's process of allocating water supplies thus assuring, by the use of its influence, that the groups' needs are met before other sectors receive their allocations. This maneuver works because there is close cooperation (involving plenty of wastas) between strategically placed government officials and these private sector agro-business groups(CI). Prime Minister Rifai - who, it will be recalled, is a wealthy Jordan Valley farmer - is himself one of those in government who is fulsome in his sympathy toward the private sector(CI,1148,3930).

However, because of the growing urgency of M&I demand, and because the success of the current five year plan depends significantly on industrial expansion, which in turn depends on sufficient water supply, the government's attitude and policies toward allocation must change in favor of a more balanced approach.

Given the relatively small size of Jordan, and the hierarchic and tribal nature of its society, there exists a tight-knit relationship among the leading families, wealthy financiers, land holders, industrialists, members of the National Assembly, the higher echelons of government (e.g. Ministers, then deputies, Secretaries-General etc.) and the Palace. The key officials of both the public and private sectors are drawn from these same interrelated circles. Many of them are connected by marriage alliances and business partnerships. Their commonalities generate among themselves a natural self-serving sympathy for their own interests. Members of this privileged stratum, individually and collectively as members of various associations such as the JVFA, exert powerful influence on government policies, not only as regards water and its associated sectors, but throughout the economy(CI).

A common method by which financiers and other persons with investment capital at their disposal influence the water sector is by purchasing on speculation land and water rights and also by investing in irrigation projects. They use their connections in government to gain privileged information and invest in water projects, particularly irrigation schemes, in regions where the government has not yet committed or allocated the water resources. By the time authorities get around to providing the water for irrigation purposes in the area where the private investors have already moved in, it must pay them sizeable compensation either for a buy-out or for leased use of the water(CI). The private interests of these privileged groups are served at public expense despite well licensing regulations and laws regarding state ownership of water intended to protect the public interest.

For example, it is explicitly declared in the 1983 Water Authority law that all water in Jordan belongs to the state. Nevertheless, virtually all industrial wells are still privately owned and operated, and the majority of them are unregulated and unmetered. Another powerful interest group is the bedouin tribes of Jordan to whom the government and Palace show great deference. The bedouins are the mainstay and most trusted element of King Hussein's army. Thus, whenever water has been discovered in a bedouin region, and officials have tried to allocate that water to other parts of the country over the objections of the local

tribes, the top government leadership has consistently intervened on behalf of the bedouins[CI]. Occasionally, national economic and social interests override those of the bedouins, as in the 1959 EGMC Law which established a special commission for equitable evaluation of property and determination of water rights as part of the program for redistributing land. The law, which favored resident sedentary landowners, was a departure from customary bedouin tribal inheritance laws[35,p365-377].

The body in Jordan that most resembles a single farmers' lobby is the JVFA, with its approximately 5000 members. Its leadership is dominated by the wealthy landowners and it sometimes is used by them as an instrument for their own ends. Cropping patterns and price fixing are two of the government's chronic problems related to water. For years, the authorities have been trying by various means - punitive sanctions, water quotas, etc. - to control cropping patterns so as to avoid annual gluts of certain vegetables such as tomatoes, cucumbers, and eggplants. By setting yield quotas and prices and by encouraging such alternate crops as onions and potatoes, the government hoped to reduce import costs and subsidies, and to improve exports of produce. However, the farmers' lobby, which opposes government intervention, together with the Prime Minister's own position as a large scale farmer has frustrated the governments efforts[CI,787,4092,3373].

The resistance of influential farmers and industrialists to various kinds of government intervention and regulations and their ability to circumvent controls has also led to problems in the maintenance of adequate standards of water quality. Water quality in Jordan is now an issue equal in importance to water quantity. The government is a little belatedly attempting to legislate and regulate quality control more firmly. But having been previously soft and inconsistent in its enforcement and thereby allowing entrenchment of special interests who wish to avoid the cost of maintaining water quality, the government is now experiencing difficulties in improving this vital area.

Several ordinances have been legislated to insure water quality - e.g. the Water Authority Law of 1973, Regulation No. 26/1977 on groundwater monitoring, the Jordan Valley Standard Specification No. 202 - but enforcement of these rules, whether in the hands of JVA or WAJ, has been weak and susceptible to the machinations of special interests, especially as regards the extraction and use of water for agriculture and M&I. The clandestine dumping of untreated industrial wastewater into rivers and wadis, and the pollution of Amman's drinking water in 1987 has already been cited. But the ways in which Jordanian water consumers escape the eye of the quality monitoring agencies are multifarious. For example, riparian farmers on the Zarqa River consistently use untreated effluents for irrigation. Not only do the crops absorb some of the toxins, but the rivers receive the residue of the polluted effluents. The meter cheaters, rural and urban, do what they will with the water and pass it on untreated and undetected[CI,4092,p.42-44,3547].

Occasionally, there are persons in government agencies who try to apply the laws firmly. If they possess sufficient clout themselves, for example a Minister with strong ties to the Palace, or if they are

resolutely backed by an elevated authority, they can succeed, at least temporarily. But more typically, those whose actions are hindrances to the interests of special groups, are either shifted to another position, paid off, or ignored(CI).

The ineffectual oversight and maintenance of water quality can be attributed to a familiar litany of factors intrinsic to the water sector bureaucracy: ambiguous assignments of responsibility, duplication of authority among various agencies - e.g. water quality monitoring and enforcement delegated variously to JVA, WAJ, AWSA, and NRA (conspicuously absent from the list is the Ministry of Health which is best equipped to determine microbiological and chemical content) - the interagency rivalries, chronic shortages of trained manpower and resources, and a socio-political system that favors privileged private interests. The matter remains unresolved and abuses continue. However, this is a priority item for MOWI which the new Minister is pledged to solve, but given the issue's history and the prevailing political ambiance, success, however urgently needed, will be difficult to achieve.

4.4 Foreign Special Interest Groups

Among the various parties who influence water use policies, foreign expert consultants and aid granting agencies must be mentioned. Over the past thirty years, Jordanian authorities appear to have developed a robust mind set toward employing foreign expertise to help in shaping policies and strategies for the solution of the countries problems. This tendency has been encouraged and strengthened by (and may even have been born of) Jordan's heavy reliance on foreign assistance for its economic development. Integral to such financial assistance, has been considerable funds for non-native consultation, sometimes encouraged or required by the terms of the aid. Jordan's 1976-1980 Five Year Plan typifies the degree to which foreign sources of funding impacted on policy planning. The average annual foreign financing for the water sector alone was 72% of total funding budgeted for hydrological expenditures (see Table 4.1).

Jordan was inundated during this period with a steady stream of contracted foreign consultants and construction and supply firms in the three main water subsectors: resources, irrigation and supply. The sources of aid varied - Arab, American, European, and international agencies - and the contracts awarded reflected the mix(1087,1827). In addition to the foreign aid channel, other avenues through which foreign influence has impacted on Jordanian water policy have been studies commisioned by various Ministries and paid for out of the domestic budget, and the frequent conferences that Jordan conducts to study its needs and problems. Examples significant to the water sector are the Science and Technology Policy Conference, Amman 1978; the National Water Symposium, Amman 1978; the Symposium on Israeli and Arab Waters, Amman, 1984; and the several meetings held in conjunction with the reports on the various Five Year Plans, notably the 1981-1985 Plan and the current 1986-1990 Plan.

Table 4.1

JORDAN'S WATER SECTOR: 1976-80

I: Planned expenditure on water (in '000 dinars)

	1976	1977	1978	1979	1980	TOTAL
Water resources	445	532	435	316	257	1,985
Irrigation	9,180	6,230	8,730	19,500	28,500	72,140
Water supply	8,318	9,052	2,921	1,770	1,180	23,241
	17,943*	15,814	12,086	21,586	29,937	97,366

II: Sources of financing (in '000 dinars)

	1976	1977	1978	1979	1980	TOTAL
General Budget	5,573	5,989	3,209	4,456	7,517	26,744
Foreign loans and assistance	12,370	9,820	8,877	17,130	22,420	70,617*
Total	17,943	15,809*	12,086	21,586	29,937	97,361*
% Foreign funds/Total	68.9	62.1	73.5	79.4	74.9	72.5

* These figures were added incorrectly in the original and have been corrected here.

Source: Five Year Plan: 1976-80

So pervasive did the influence of foreign consultants become in such areas as the water sector that many Jordanian specialists, trained both in Jordan and abroad, complained that the real shapers and managers of water policies and water use strategies were the foreigners advising government officials(CI). So receptive have Jordanian authorities been to foreign consultants that insufficient attention has been given to developing an in-country cadre of experts capable of providing the government with whatever advice it needs. Until quite recently, Jordanian technocrats and scholar/specialists have played only a secondary or minor role in the designing of water (and other sector) policies. In the policy formulation process already described in Chapter 3, the contributions of Jordanian specialists could be, and often are, overridden by the recommendations of foreign consultants at the point where policy decisions are made by the government's policy makers. Whether or not the counsel of the foreign consultants has been the best advice, this situation has had an increasingly demoralizing effect on Jordanian experts(CI).

The attitude of the latter is that they are at least as well trained as the outsiders, they understand local conditions better, (that is, how Jordan's society and government function), are more likely to

recommend policies that will work smoothly within the domestic scene, and, they claim, they serve primarily the interests of the nation rather than those of foreign governments or international agencies or the profit making concerns of a private corporation. Moreover, they argue, it is the Jordanian specialist who must implement the policies and strategies configured by foreigners, whether or not they, the Jordanians, agree with or had a hand in shaping them. They feel, on the whole, that while there is a useful place for foreign consultation, its role should be the secondary one, for purposes of evaluating and backing up the Jordanian teams(CI).

Although this posture has considerable merit and is beginning to receive a sympathetic response in some quarters of government, there are certain factors that work against a complete change soon in the water sector. Chief among them is a serious shortage of the right kind of Jordanian expertise; and as a corollary of manpower shortage, there is insufficient appreciation among both government and academic leadership that if Jordan is to achieve self-sufficiency in hydrological expertise, it is essential to create a Jordanian matrix of social sciences complementary to that of the hard sciences in water related matters and then to integrate the disciplines. That would require providing the necessary quality training programs and facilities in the universities and Ministries. These requirements are still lacking in sufficient measure.

Finally, another factor, more intangible but no less important than the others, one that perhaps in part explains the enthusiasm for foreign consultants, is a feeling among government authorities that because native Jordanian experts are an intergral part of the hierarchical social system of Jordan, they are therefore susceptible to the workings of the system with its layered webs of influence. Thus they may not bring a full measure of scientific standards and objectivity to their work and may also be vulnerable to manipulation. The Jordanian specialists make the counterargument that foreign consultants often tell government authorities what they want to hear instead of what the objective circumstances demand in order to please and thereby win more contracts(CI).

However, there is evidence that attitudes are changing. Poor performance and advice by foreign consultants, and the failure of various projects during the last decade combined with a growing sense among officials that they have often been misled, are experiences that have directed the government toward a new tactic. In 1987 the Prime Minister decided that water policy and use strategies would be devised initially by various appropriate Jordanian committees working with or under the aegis of JVA or WAJ. But the intentions of this experiment were not fully realized because neither agency possessed the necessary manpower. Consequently, both have continued to have recourse to foreign consultants(CI).

Presently, since the creation of the new Ministry, an effort is being made to develop policy and manage the Water sector within MOWI. The new Minister, Ahmad Dokhgan, while still in the process of completing

the organization and staffing of his Ministry, has undertaken the responsibility for developing policies as well as administering current projects, overseeing water quality, allocating and distributing water resources, conducting or commissioning project feasibility studies, and in general, juggling the pressures of the various financial, agricultural, M&I, tribal, and regional special interest groups. This has required many compromises and the acceptance of past management practices, but that is the only way that his Ministry will function with any effect until it takes its final shape.

4.5 Constraints on Water Policies and Strategies

Although water has steadily moved up in the ranking of national priorities as reflected in the recent sequence of Five Year Plans, the satisfaction of water sector needs has been frustrated by several constraints*. These by now familiar constraints may be summarized as follows:

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* An exception to the perceived priority ranking of water may be found in a speech before the National Assembly by the Minister of Finance, Salim Musnidah, delivered November 29, 1983, in which he placed water fifth out of six national priorities(2142p14-19).

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1) Water scarcity

2) A paucity of well trained specialists in both the scientific and social scientific dimensions of water. After scarcity, this constitutes the chief constraint on water use policy formulation and on its implementation in all branches of the water sector. The shortage of specialists magnifies the problems associated with water scarcity. Among the hundreds of engineers in the JVA and WAJ, relatively few are trained as hydrological specialists(CI).

3) The absence of a vigorous, adequately funded policy to promote training and research in the various branches of hydrology with a view to producing an indigenous reservoir of water specialists who can generate or adapt existing technology to serve the needs of Jordan's water sector.

4) inadequate documentation and classification of water data, which stems in part from too few research projects and studies which are systematically interrelated.

5) Serious shortcomings in the organization, administration, and management of the water sector. This includes interagency rivalry, an overlapping bureaucracy, conflicting authority and responsibilities, lack of effective coordination among water agencies, duplication of effort, and wasteful use of critically short manpower. This situation has given rise to a harmful fragmenting competition among users, principally

agriculture and M&I, in both the private and public sectors. It has also promoted regional conflicts over water resources between the northern and southern regions, the eastern and western Ghors, and the Jordan Valley and the Highlands. As a consequence, various governorates lobby to keep control over whatever water resources exist within their regions for local use. All of these quarrels make the fashioning of an equitable and effective national water policy all the more difficult to attain and execute.

6) An insufficient network of extension and technical services to water users, especially in the agricultural sector.

7) Weak enforcement of water laws and regulations that would control abuses that are very costly in terms of money and waste.

8) Poor attitudes among government workers in the water sector characterized by low productivity, laxness in carrying out regulations, poor morale, and a willingness sometimes to accept monetary bribes or favors[CI].

4.6 Assessment

All of these constraints on the development and maintenance of effective water policies are well recognized in Jordan by government authorities and water experts alike. The growing urgency of Jordan's water problems has generated an equally exigent quest for solutions. What first steps need to be taken to ease the constraints and set water policy formulation on a more efficacious path are obvious. Most of them are the logical converse of the constraints, and, taking the continuance of scarcity as a given, may be briefly summarized thus:

1) Water must be accorded top priority in national planning.

2) New ways of devising policies and of planning for major water development schemes must be established. This should include long-term budget and investment planning and the creation of an integrated water resources model for surface and groundwater together with an adequate computerized data base. The creation of MOWI is an opportunity to reorganize and improve existing planning processes and to develop new approaches.

3) New legislation, which would supersede most of the current statutes, that would equitably regulate water use allocation is urgently required. The new codes should link allocation to real need, current and future, and to land use in ways that would define the limits of growth of cities and towns and restrain the haphazard sprawl of housing and other facilities which require the constant expansion of water networks, sewerage systems, canals, and other public conveyances. Such expansion has not only strained current water resources, but increases water losses, which already amount to about 50% of pumped water and wastage within the unimproved system.

4) A more intensive application of technology and physical improvement in the conveyance and use of water in both agriculture and M&I. This would apply to on-farm use, new farming techniques, expansion of piped water throughout the country, more efficient purification treatment of industrial and domestic effluents and irrigation water.

5) Construction of various hydrological infrastructure projects - dams, canals, catchments, etc., but above all Unity Dam -- including roads and other transport facilities for distributing water over distances, in accordance with an integrated long term development plan which sets forth a rational order of priorities that are adhered to consistently.

6) Maximum recycling of wastewater for use in agriculture and industry. This would require increased investments in a more intensive exploitation of appropriate technologies.

7) The creation of a well funded and equipped national entity, perhaps in the form of an institute, for water research and technical water services. This organization would serve all water and water-related sectors. Among its responsibilities would be to generate research and design operational models, conduct various studies for the government, create a national water database, coordinate the flow of data and information, and to evaluate the work of foreign consultants.

8) Enforce resolutely and uniformly all regulations intended to conserve water and produce revenues sufficient to cover the cost of producing water. Meter cheaters, industrial polluters, water speculators, and water wasters of all stripes must be made to comply with the rules without regard to privilege or status.

9) A well-planned and sustained national campaign for the conservation of water should be undertaken by the government immediately. This would include educating the public in schools and through the media about water, its uses, the importance of preservation, and how water can be conserved.

When these defined needs are put to Jordan's political leadership, Jordanian hydro-specialists and to some foreign experts, a consensus of general agreement emerges on the need for implementing these proposals. Differences, as might be expected, lie in the order of priority accorded to the individual recommendation, but not at great variance with the ranking given here[CI].

All of these proposals are, hypothetically, doable. The government has been for some time implementing many of them such as infrastructure projects, better farming techniques, recycling, etc.. However, constraints which are integral to the way things are done in Jordan, as well as those physical and fiscal limitations built into the water situation itself allow little hope that this entire inventory of recommendations will be implemented. But obviously survival dictates that the most critical of the recommended actions must be completed. The prognosis is best for those proposals that least affect entrenched

political and financial interests. These changes will require considerable adroitness by the authorities, but at this juncture it appears that the array of urgent problems confronting Jordan does not allow its leadership the latitude of much time to finesse the politics of the situation.

Chapter 5
REGIONAL, INTERNATIONAL AND STRATEGIC DIMENSIONS OF WATER ISSUES*

When a resource vital to life, such as water, is shared between two or more nations, and when that resource is in short supply, there is cause for serious tension. When scarcity is set in a context of general hostility, as in the Middle East, the result can be prolonged large scale conflict. In the Middle East, increased population, irrigation, industrialization, urbanization, militarization, and other thirsty changes of modernization have been rapidly superimposed upon the hydropolitical economy of the entire area. This circumstance has heightened competition for the use of the region's uneven, mostly scarce water supplies, thereby forcing greater attention to the linkages between vital natural resources and international relations and security problems.

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* The distinction between issues and situations is, understandably, often confused because they tend to share mutual characteristics. For purposes of this discussion, the distinction made by Frey(3235p70-73) will be employed. Frey differentiates a situation as a set of curcumstances which can be more or less objectively perceived, as in the storage capacity of a dam or a variation in the flow of a river, while an issue is defined by its subjectivity as a psychological variable. That is, a situation of water shortage (that can be measured) is perceived as an issue by an individual or collectivity, such as an agency or government, in terms of its consequences for the perceiving actor. If those consequences are deemed to represent frustrated or potentially frustrated interests, then the situation is an issue. By this definition, an issue will always be "subjective, perceptual data for the analyst"(3235p72).

Because it is indispensible to all life, water is an incredibly complex issue, at once physical, political, economic, legal, social, symbolic, and ecological. Each of those features is inversely related to the others. In the Middle East, water is a conflict-laden determinant of both domestic and external policies of the region's principal actors. When water shortages occur and full utilization is reached, as, for example in Jordan and Israel, these policies tend to be conceived more and more in zero-sum terms, intensifying security concerns and adding to the probability of violence.

As a basic determinant of relations between sets of nations, water is endowed with characteristics peculiar unto itself that distinguish it from other foreign affairs issues. These unusual features are:

1. No issue is so crosscutting as water because water is essential not only to existance but also to the quality of life.

2. Scarcity of water is always a zero-sum security issue and thus creates a constant potential for conflict.

3. Because of its sheer complexity in physical, practical, ideological, and symbolic terms, the issue of water is more difficult for policymakers and scholars to grasp in its entirety and tends to be dealt with piecemeal both domestically and internationally; it is thus more fragmented than other issues.

4. Law as a means of settling and regulating water issues remains rudimentary and relatively ineffectual. There are no adequate agreed-upon legal structures in place for settling international riparian disputes. Therefore, law lacks the capacity at present of being an effective instrument for regulation.

5. Finally, precisely because it is essential to life and so highly charged, water, unlike most other volatile issues of international relations, can -- perhaps tends to -- produce cooperation even in the absence of trust between the concerned actors. The operation of what can be called "superordinate goals" (4322p.67) appears to have had considerable influence in retarding water based conflict in the Middle East. When hostile groups are compelled, for whatever reasons, to share essential common goals -- that is, superordinate goals that are by nature overriding -- and when cooperation clearly benefits all concerned, the hostile groups tend to cooperate rather than fight. Furthermore, when successful, this cooperation produces positive changes in how the actors perceive one another in regard to other conflictual issues under negotiation.

Nowhere has this corollary of water-based conflict been demonstrated more dramatically than in the modern Middle East; given the long history of hostilities in the region, remarkably few military attacks have been targeted against waterworks even in the bitterest strife between Middle Eastern riparians.

Jordan, where inter-riparian hydro-political problems are at an advanced stage, offers an almost perfect microcosmic illustration of the relationship between water and international security issues for the entire Middle Eastern region. Understanding the foreign relations facets of the problems involved is considerably helped if a few salient international legal factors are first exposed.

5.1 The Role of International Law

It is an assumption of law that the allocation of scarce resources requires legal means, rather than coercive force, if conflict is to be avoided. International law recognizes as a customary rule of law the community of property among riparian states. That is, each is entitled to use a share of the river so long as unreasonable injury to another

riparian does not ensue. Although this principle has been upheld in courts, it contains an inherent weakness and has also been challenged by countervailing legal arguments. The flaw lies in the fact that customary rules tend to be highly unstable unless all involved parties have compatible interests, preferably guaranteed by formal agreement. The challenging arguments are exemplified by the principles of absolute sovereignty of territory, absolute integrity of the waterway, and by the doctrine of prior appropriation (or prior consumptive use). A complementary doctrine that is sometimes invoked is that of "basic justice and fairness" (*ex aequs et bono*).

Proponants of absolute sovereignty contend that a riparian has unfettered rights to do whatever it deems fit with the water (or any other resource) within its territory. Upholders of absolute integrity maintain that no riparian may significantly alter the quantity or nature of the water before passing it on[4323,3235,pp157-67,5-6]. The prior appropriation doctrine rests on the dual premises of priority in time and beneficial use. The priority proposition - "first in time, first in right" - allows the allocation of water in times of scarcity to the consumptive user who first drew water from the source. The beneficial use principal is more difficult to define precisely. In general, it is constituted of two separate but related elements: social utility and engineering efficiency. That is, "a use is beneficial if it involves some socially accepted purpose and if it makes a reasonably efficient use of the water"[4321,p55;3235,pp58-62]. This precept is useful when the issues involved clearly reveal the justice and fairness of a case and when the litigants are disposed toward an agreement. In fact, the Statute of the International Court of Justice (Art.38[2]) permits decisions on this basis only if the parties specifically so agree. This precept of equitability appears to be slowly gaining favor as a legal standard in such areas of dispute as the setting of boundries. All of these juridical precepts have been applied at one time or another, to the Jordan River System, but more often in a political arena than in a court of law.

Obviously these legal principles can be and are usually treated as mutually exclusive and contradictory. Without the regulating influence of clearly defined, consistent, applicable laws, these and other legal arguments will continue to be put forth by various contending Middle Eastern riparians as best suits their interests. With the important exception of Egypt and the Sudan, who made a formal regulatory agreement in 1959 and continue to abide by its terms including a clause mandating arbitration of disputes, Middle East riparians simply do not commonly resort to law for the mediation or resolution of water problems[4323,3235pp5-6,157-67;4313].

On international fresh water issues, firm rules of law together with necessary legal structures responsible for effective application are largely missing. This circumstance has allowed water issues to be manipulated as part of the power relationships throughout the Middle East without mitigating legal instruments or precedents for settling water conflicts. As long as the relative balance of power among the consumptive users of a waterway is disproportionate, as it is among the Jordan River System riparians, and if those riparians are mutually

hostile, as Jordan, Israel, Syria, and Lebanon are, then in the absence of formal arrangements, the potential for water based conflict will always be high and power will be the final arbiter.

There is nothing inherently lacking in legal theory or in law itself that has produced such a condition. The basic problem -- it is precisely at this point that politics and law come together where water is concerned -- is the absence of formal political agreements (treaties) that govern the general and specific terms of apportioned waters, together with the essential international or inter-riparian oversight that assures compliance among the concerned parties. Such agreements are the requisite first steps toward transforming legal theory into the institutional application of law. Only with the political agreements in place can there be created an adequate array of effective legal instruments for resolving international disputes such as exist in the Middle East over shared water resources.

5.2 The Jordan River System and International Law

Because of various litigious situations and claims by the Jordan's riparians, the Jordan River System has become in modern times a fairly good case study for the problematics of international riverine and groundwater law. Before the destruction of the Ottoman Empire in 1918, the Jordan River, together with the region's other major river systems, being encompassed by the Empire remained unified basins for half a millenium and thus raised no questions of international law.

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* The following treatment is based largely on inputs from Joseph W. Dellapenna, Professor of International Law, Villanova University (he was an early member of the project's team), and also on reference Nos. 3235 (pp 1-17 and 158-82), 4323 and 4322.

Under the mandate system created by the World War I settlement, the unity of the region's river basins (including the Jordan) were no longer intact, having been divided between the Mandatory powers Britain and France. Nevertheless this separation generated no serious international disputes because the British and French managed to negotiate the minor problems that developed. Even when treaties were made setting a boundary along a Middle East river, the agreements were bilateral and rarely included terms for sharing the water among consumptive users. But when the mandatory countries and other nations in the region achieved independence, the unification of the river basins under a single regime ended, and control devolved on the successor states who had to share the waters. Controversies over the consumptive use of several of the rivers were immediately sparked.

After the creation of Israel, competing claims to the Jordan basin intensified while at the same time becoming more complex. The 1967 Arab-Israeli war added new complications to the situation by not only altering the boundries among the riparians and thereby engendering another unresolved dispute, but it also altered the riparian status of all four of the countries that have water use rights in various parts of the Jordan River Basin, not to mention the Palestinians who also have significant claims to the Jordan's waters.

Until 1978, when Israel established a permanent sphere of influence in the South of the country, Lebanon was upper riparian to the Upper Jordan, i.e. the Hasbani R. branch, most of which now flows through the Israeli security zone in Lebanon and is controlled by Israel. Consequently, Lebanon presently has lost its capacity to regulate any part of the Jordan system and has thereby, for all practical purposes, lost its Jordan River riparian status to Israeli power.

Syria was an upper riparian on the Upper Jordan by virtue of its unfettered control of the main springs of the Banias River and Syria's abuttment on the main branch of the Jordan above Lake Tiberius (this was a demilitarized zone so that Syria's claims to rights was disputed by Israel.) Israel's occupation of the Golan Heights in 1967 effectively removed Syria as a riparian on any part of the Upper Jordan, but Syria remains the upper riparian on the Yarmuk River.

Jordan was and is the middle riparian on the Yarmuk and was and continues to be the lower riparian on the trunk of the Jordan below Lake Tiberius. What has changed for Jordan is the West Bank portion of the Jordan river. Whereas Jordan was previously the sole riparian in the West Bank, that is, on the lower reaches of the river abutting the West Bank, it must now share that status with Israel.

Israel, prior to 1967, was the lower riparian vis a vis the Hasbani and Banias Rivers, but is now the effective sole riparian on the Upper Jordan. Israel has, ever since its creation, been the sole riparian on the Dan River branch of the Jordan system. Israel was and remains the lower riparian on the Yarmuk, although its occupation of the Golan Heights has extended its control of the north bank of the Yarmuk by about half a dozen miles. Israel now controls all of the headwaters of the Upper Jordan. That fact combined with Israel's military strength has elevated Israel to the status of the most controlling riparian in the Jordan River basin.

Not suprisingly, the various legal claims made by the four Jordan basin riparians have altered in accordance with changes in their perceived interests and with their changed status, except for Lebanon which espoused the claim of absolute territorial sovereignty and has never abandoned that posture. Obviously, in the current chaotic conditions in Lebanon, that claim would be egregious were it to be pressed. Syria adopted an ambiguous kind of customary rule until 1964 when it asserted the traditional upper riparian attitude of absolute territorial sovereignty on which it continues to insist ineffectually today. Jordan, prior to 1967, assumed the stance of absolute integrity

of the river system, and also insisted that other states could not divert water outside the watershed of the Jordan. If enforced, this Jordanian position would on the one hand have precluded consumptive use by any other state in the basin and on the other have allowed only in-basin uses by other riparians. Had Jordan been able to press these claims successfully, Israel could not have used the Jordan River for its National Water Carrier or carried out its development plans for the vast out-of-basin tracts in the Coastal Plain and Negev Desert. Since 1967, Jordan has taken the position of riparian community of property. This latter claim is the same posture adopted by Israel until 1967 when having greatly improved its riparian status, Israel has since been insisting on the absolute territorial sovereignty rule.

Efforts in the 20th century to devise and apply equitable schemes for sharing the water of the Jordan basin have been defeated by the variety, complexity, and persistence of political obstacles among the consumptive users of the river system. The weakness of international riverine law, with its apparent lack of a firm customary rule for decision, has contributed indirectly to the failure of proposed political solutions. In 1966, the International Law Association adopted a set of nonbinding recommendations -- the "Helsinki Rules" -- on the use of water in international rivers(4353). But this laudable endeavor has produced little more than a useful compendium of guidelines.

The Helsinki rules have essentially the same effect as customary international law with the same inherent legal fragilities. They leave the resolution of competing claims to consumptive sharing of fresh water to negotiation, mediation or doctrines of basic fairness and justice. None of these juridic approaches have so far proven effective against the array of rival political claims by the Jordan's riparian users based on a variety of countervailing legal principles. But, without the necessary political agreements in place, the Helsinki Rules could not be expected to do more than provide a set of guidelines for what must be very complex and difficult negotiations should they occur, and to govern the execution and maintenance of any agreed upon solutions that emerge.

While law cannot provide all the answers or impose solutions, law is nevertheless essential to the process of finding legitimate and stable outcomes to the quarrels that divide the Jordan's riparians. Thus, law must supercede force as the means for resolving the hostilities along the Jordan River System.

5.3 The Search for Cooperation

Since the beginning of this century a plethora of international schemes for developing, regulating or dividing the waters of the Jordan River basin have been proposed, all of them requiring some degree of inter-riparian acquiescence and cooperation. Between 1913 and 1964 some twenty one such proposals were put forth, over half of them between 1950 and 1957*.

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* All of these plans need not be reviewed here since there are good discussions of them in easily available sources. The best summary treatment will be found in reference 3235, pp 30-44. On the Johnston Plan (also known as the Unified Plan), see State Department documents of September 30, 1955, October 11, 1955, and January 31, 1956 (documents not yet declassified and published). Also see reference Nos. 4350, 4219, 4314, and 4323.

DEVELOPMENT SCHEMES FOR JORDAN RIVER SYSTEM

Year	Plan	Sponsor
1913	Franghia Plan	Ottoman Empire
1922	Mavromatis Plan	Great Britain
1928	Henriques Report	Great Britain
1935	Palestine Land Development Co.	World Zionist Organization
1939	Ionides Survey	Transjordan
1944	Lowdermilk Plan	U.S.A.
1946	Survey of Palestine	Anglo-American Inquiry
1948	Hays-Savage Plan	World Zionist Organization
1950	MacDonald Report	Jordan
1951	All Israel Plan	Israel
1952	Bunger Plan	Jordan/U.S.A.
1953	Main Plan	UNRWA
1953	Israeli Seven-Year Plan	Israel
1954	Cotton Plan	Israel
1954	Arab Plan	Arab League Technical Comm.
1955	Baker-Harza Plan	Jordan
1955	Unified (Johnston) Plan	U.S.A.
1956	Israeli Ten-Year Plan	Israel
1956	Israeli National Water Plan	Israel
1957	Greater Yarmuk Project (East Ghor Canal)	Jordan
1964	Jordan Headwaters Diversion	Arab League

Source: Reference 3235

Since 1948 there have been no less than fourteen schemes put forward by the U.S., Jordan, Israel, the U.N., the World Zionist Organization and the Arab League for sharing and developing the waters of the Jordan. None of these, regardless of how workable or how sensible, has been adopted. The best known plan is officially titled the Unified Plan and is popularly called the Johnston Plan of 1955. On October 16, 1953 President Eisenhower appointed Eric Johnston as special ambassador to mediate a comprehensive plan for regional development of the Jordan River system. It was based philosophically on the Marshall Plan in Europe. The major negotiating issues pertained to:

1) The water quotas for riparians
2) The use of Lake Tiberias as a storage facility
3) The use of the Jordan waters for out-of-basin areas
4) The use of the Litani as part of the system
5) The nature of international supervision and guarantees.

All of these issues involved the political, economic and security concerns of the four sovereign and mutually hostile riparians, making their resolution extremely difficult.

Of all the schemes concocted for the Jordan River, the Unified Plan is easily the most important and comprehensive and came closest to being successfully adopted. The Johnston Plan warrants some further study here for the instructive illumination it provides on the limits of cooperation and legal/political solutions to the conflicts among the consumptive users of the river system.

Jordan emerged from the 1948 Arab-Israeli war heavily burdened by the dislocations caused by the hostilities and by the enormous Palestinian refugee problem with which it found itself saddled. The influx of some 450,000 Palestinians expelled from Israel added to the 460,000 West Bank Palestinians suddenly magnified Jordan's population by an exponential 80%. (Transjordan and the West Bank were combined in 1950 to create the present Hashemite Kingdom of Jordan). Jordan was too overwhelmed by these problems to undertake large water projects.

Israel, on the other hand, resumed its unilateral water planning immediately with the cessation of hostilities and by 1951 the All Israel Plan was completed. This plan was subsequently transformed into the Israel National Water Carrier project which was the keystone of Israel's water development, and required the diversion of Jordan River waters to the Coastal Plain and Negev Desert. Implementation of the project, beginning with drainage of the Huleh swamps, caused foreign policy complications and even shooting incidents, because the Jordan's waters were to be channeled out of the basin and also because the Huleh drainage infringed on the demilitarized zone with Syria.

Israel's unilateral actions added to the urgency of Jordan's need to do something about its economic situation, already made critical by the refugee problem. Jordanian planners decided that the best way to

settle the refugees was through the development of large scale irrigation projects. Jordan then commenced in early 1950 on its own unilaterally charted course of water planning focussed on the construction of a large dam on the Yarmuk at Maqarin and the irrigation of the Jordan Valley (the Bunger Plan).

In July 1953, Israel commenced the diversion of the Jordan at Jisr Banat Yaqub, a site that was situated in the demilitarized zone. When Israel ignored the reaction first of Syria then of the U.N. which had ruled in favor of Syria and asked Israel to cease construction, only pressure from the U.S. forced the Israelis to move the diversion to another site. The new locale was Eshed Kinrot where water salinity was higher and electric power rather than gravity had to be used to move the water to the National Carrier.

The tension generated by this incident and the desire to find some basis for settling the Arab-Israeli problem, motivated the U.S. to involve itself more deeply in the development of the Jordan River System. The Johnston mission was the offspring of this decision.

The premise of the Johnston mission was that the superordinate goals of profitable cooperation, economic development, and political stability, desired by all the antagonists would override their mutual belligerance and make a peaceful settlement of watersharing and other regional issues more possible. This was a rational hypothesis.

The various schemes put forward between 1953 and 1955 were for the most part bargaining phases in the negotiating process. In setting out on his assignment, Ambassador Johnston took as his compass the Main Plan. This was an UNRWA sponsored study prepared by Charles T. Main under the supervision of the Tennesee Valley Authority with the backing of the U.S. State Department. The key features of the Main Plan were:

1) a dam on the Hasbani to provide power and irrigate the Galilee area
2) dams on the Dan and Banias rivers to irrigate the Galilee
3) drainage of the Huleh swamps
4) a dam at Maqarin with 175 MCM storage capacity to be used for power generation
5) a dam at Addassiyah to divert water to Lake Tiberias and into the East Ghor area
6) a small dam at the outlet to Lake Tiberias to increase the lake's storage capacity
7) gravity-flow canals down the east and west sides of the Jordan Valley to irrigate the area between the Yarmuk and the Dead Sea
8) control works and canals to utilize perennial flows from the wadis

Main also recommended primary in-basin use of the Jordan waters and opposed integration of the Litani River into the Jordan basin development projects. His plan also proposed provisional quotas of water, allotting

Israel 394Mcm/yr, Jordan 774/yr and Syria 45/yr. The final allocations in the Johnston Plan gave Israel 400Mcm/year, Jordan 720/year, and Syria 132/year.

What is interesting about the negotiations over the Johnston Plan is that despite very hard bargaining over difficult and sensitive issues, disagreements were in fact reduced, and compromises were worked out for most of the tough problems -- even, briefly, for the two most obstinate issues of allocations and international supervision. An agreement consisting of formulas for implementation which could have served as the basis on which to build legal structures was drawn up and circulated in the summer of 1955, and accepted by the technical committees of both Israel and the Arab league. Here was a situation where the aforementioned principle of "superordinate goals" was operative.

Table 5.1

WATER ALLOCATIONS TO RIPARIANS OF JORDAN RIVER SYSTEM
(in million cubic meters/year)

Plan/Source	Lebanon	Syria	Jordan	Israel	Total
Main Plan	nil	45	774	394	1213
Arab Plan	35	132	698	182	1047
Cotton Plan	450.7	30	575	1290	2345.7
Unified (Johnston) Plan					
Hasbani	35				35
Banias		20			20
Jordan (main stream)		22	100	375*	497*
Yarmuk		90	377	25	492
Side Wadis			243		243
Total Unified Plan	35	132	720	400*	1287*

Source: Reference 3235 NAFF + MATSON

Note: The Cotton Plan included the Litani as part of the Jordan River System. Different plans allocated different amounts in accordance with differing estimates of the resources of the system. One major variable in the reporting of the planned allocations is the amount of groundwater included in the estimates.

* According to the comprise "Gardiner Formula", the share to Israel from the main stream of the Jordan was defined as "residue" after the other co-riparians had received their shares. This would vary from year to year, but was expected to average 375 MCM.

Unfortunately, while the influence of superordinate goals brought the parties to the threshold of formal agreement, it was insufficient to propel them over into a treaty agreement. The political problem of impartial monitoring of water withdrawal and the implacable hostility of factions among both Arabs and Israelis prevented final acceptance. Nevertheless, despite political non-approval, the principal riparians of the Jordan system, Israel and Jordan, determined to adhere informally to the technical details of the plan in the context of their unilateral water planning. This included acceptance, in terms of an order of magnitude, of the water quotas proposed by Johnston. The other riparians followed suit.

5.4 The Militarization of the Jordan Basin

Until 1967, this arrangement worked, but was deteriorating by the time hostilities broke out again. The most serious challenge came in 1964 just as the Israelis were on the verge of completing the National Water Carrier. In that year Israel began diverting a significant quantity of water from Lake Tiberius for use outside the Jordan River Basin. The Arab states never accepted Israel's insistance that it had a right to carry out the project; they objected strenuously and threatened counter measures. The Arab camp, seeing the Carrier and Israel's continued unilateral water development plans as a serious threat to Syrian and Jordanian long term hydrological needs, decided to thwart Israel's Carrier by diverting the headwaters of the Jordan either by channeling the Hisbani to the Litani or the Banias to the Yarmuk. The latter option was chosen. However, neither choice was practical and at best only marginally feasible. The project was technically arduous because of such obstacles as soil porosity, and was so expensive - the estimated cost was between $190-200 million - as to be comparable to the entire expenditure of building Israel's National Water Carrier.

However, if successfully completed, the diversion would have deprived Israel of an estimated 35% of its contemplated withdrawal from the Upper Jordan, equivalent to one-ninth of its annual water budget, and effectively reducing by one half Israel's supply for the Carrier. In 1965 work commenced on the headwater diversion and Israel responded with a series of military strikes culminating in air attacks deep inside Syria on April 4, 1967.

Until this date, there had been only a dozen incidents of violation of the tacit water agreement that resulted in violence, but half of them occured in the two years preceding the 1967 Arab-Israeli war. This intensification of water related hostility between Israel and its Arab neighbors was a significant causal factor that led to the June 1967 war. After the Israeli victory in the Six Day War and Israel's occupation of the West Bank and the Golan Heights water disputes in the Jordan River basin became militarized. At the same time, utilization of the water among the riparians became more unilateral and more competative, until the 1987 Jordanian-Syrian agreement for the building of the Unity Dam.

Israel's achievement of hydrostrategic paramountcy has ended all question of headwater diversion by Syria and even any small-scale impoundment that might be attempted by Jordan can be easily detected and attacked by Israel (although there is no evidence that Jordan is in anyway contemplating such provocative actions). Indeed, since 1967, Israel has used water increasingly as an instrument of its strategic policies. Between 1967 and 1971, the East Ghor Canal was put out of commission four times by Israeli attacks, the worst incidents coming on June 23 and August 10, 1969.

Although the ostensible reason for these raids was retaliation for PLO guerilla actions against Israeli settlements which intensified in 1968-69, the summer raids on the EGMC may well have been water-related. Israeli authorities noted that in April-May 1969 the average base flow of the Jordan fell by 686 mm (or about 2.4 feet). Israel immediately assumed that the cause was Jordan's overpumping in excess of its Johnston Plan quota. Israel's military attacks touched off a flurry of activity among U.S., Jordanian, and Israeli hydrological specialists and diplomats which eventually revealed that the water level decrease resulted from natural causes. The incident highlighted again the need for an impartial water monitor. After a set of U.S. mediated secret negotiations between Jordan and Israel in 1969-70, Jordan was allowed to repair the EGMC in return for assurances it would abide by the Johnston plan quotas and would curtail PLO activity in Jordan[3235,pp43-45]. King Hussein honored both pledges, expelling the PLO from Jordan in 1970.

Despite the success of this U.S. mediation, the 1970 secret Israeli-Jordanian agreement did not promote a large scale cooperation; but a mutual sense of their superordinate interests did serve to get Jordan and Israel past occasional water based frictions which were all negotiated secretly. However, the larger confrontational water issues - such as quotas, riparian status and water security, West Bank groundwater, the Unity Dam, etc, have continued to be implacable because they are perceived to be integral to the fundamental Palestinian issue of a territorially based peace settlement, which has proven to be intractable. The Arab riparians see Israel as frustrating the legitimate rights of the Palestinians and their own legitimate claims to the water of the basin, as well as hindering their water development schemes.

The consequence has been increasing militarization of water disputes between Jordan and Israel. The most serious contentions have been over competative consumptive use of the Yarmuk. Since Israel's occupation of the northern reaches of the Yarmuk River boundry between Syria and Jordan, the Yarmuk has constituted the post-1967 armistice borderline. That arrangement ensconced Israel directly opposite the intake tunnel of the EGMC, a one kilometer tunnel channeling river water into the canal. Israel used its position to obstruct Jordan from carrying out maintenance to prevent the intake from silting up and damming the flow of water into the canal. A small island of rock and silt formed, considerably diminishing the flow of water into the EGMC.

It required two U.S. mediatory efforts, one in 1976, the other in 1979, to bring a degree of relief for Jordan. Israel agreed each time that Jordan could service the intake by removing the rocks but the silt bar was to remain undredged. Israel contended that removal of the silt would affect the flow of the river in such a way as to diminish its share of the Yarmuk and increase that of Jordan's. USAID experts, however, confirming Jordan's position, demonstrated that if Israel sufferd any loss at all, the amount would be trivial(CI) . When Jordan tried to bulldoze the silt away, the Israeli's drove off the Jordanians with gunfire. Then, some days after the rocks were removed in July 1979, Jordan charged that the Israelis had replaced the rocks under cover of night in such a way as to divert the flow of water away from the mouth of the canal into Israeli occupied territory. (The charge has been privately comfirmed by reliable sources in Israel and Jordan and by a USAID official in confidential interviews.) Jordan moved troops up to the cease fire line and Israel mobilized on the other side. Only forceful American intervention prevented a fight. Quiet but tense negotiations, with U.S. technical help (from USAID specialists) have continued.

In 1984 Jordan complained that silt build up added injury to the drought conditions of that year and that Israel was taking an unauthorized 100 Mcm from the Yarmuk (75 Mcm in excess of its Johnston allocation), pumping it into Lake Tiberius and from there sending part of it to the National Water Carrier. Israel admitted drawing off the water but insisted on its own interpretation of the Johnston quota, to wit, that the 25 Mcm limit applied only to the summer months, and Israel could siphon off whatever quantity of water it chose during the wet winter season. Among all the parties to the Johnston Plan proposal, Israel continues to be the sole adherent to this dubious interpretation, and is able to apply it by virtue of her overwhelming military superiority and American acquiesence.

In this strained ambiance the over the Yarmuk, some U.S. interventions, apart from mediations to avoid hostilities, have actually contributed to the tensions because they were ill conceived. For example, in 1981, the U.S. sent Ambassador Philip Habib to Jordan, in another drought year, to persuade King Hussein to accept a water sharing scheme that would have significantly increased Israel's portion of Yarmuk water. The Israeli press cited 140 mcm but the real figure was probably closer to 60-75 Mcm, judging by statements made in 1984 by the Israeli Water Commissioner Zemah Yishai who described a scheme, based on a presumed larger Israeli Yarmuk quota, for replenishing the over exploited coastal aquifers by injecting water from Lake Tiberius which would be replaced by the extra Yarmuk stock.

Israel and Jordan also compete for groundwater near the Yarmuk-Jordan River junction. Jordanian drilling teams struck water near Shatt al-Bared in the summer of 1982. Israel claimed that Jordan's exploitation of that groundwater would damage future Israeli sources and commenced in May 1983 what it termed "retaliatory" drilling opposite the Jordanian site(3235,pp52-3,192,pp11-12,177,1336,CI) . Since 1984 sporadic tense, secret negotiations with U.S. help over the unresolved Yarmuk issues have continued between Jordan and Israel.

5.5 Water as a Strategic/Security Issue

There are a number of strategic issues in various parts of the world that could serve as trigger mechanisms for serious military conflict, and many of these issues are most intense in the unstable developing regions of the world. These "issue triggers" are often overshadowed by larger more visible concerns associated with superpower military and ideological rivalry, and neglected because their inherent complexity requires interdisciplinary approaches. This situation becomes especially urgent where a nuclear factor is involved.

Water is such an issue. The Middle East, one of the world's most dangerous flashpoints - where the superpowers compete strategically and politically and where an indigenous nuclear capacity co-exists with deep-seated local hostilities - is such an area. Demonstrably, Middle East water issues have serious implications for strategic contingency planning involving USCENTCOM and NATO (and the counterpart Soviet military organizations and alliances.

Water as a strategic issue - just as in the case of water as a foreign relations issue - exhibits certain distinguishing peculiarities. Most of these characteristics are the same as those that make hydropolitics different from other international relations issues, except that there are two additional features that are uniquely strategic:

1) Water, when scarce, is a terrain security issue since all concerned parties feel compelled to control the ground on or under which the scarce water resources are found. For example Israel's assumption of upper riparian status controlling the head waters of the Jordan has altered its strategic position vis-a-vis Jordan and Syria, stiffening Israel's resolve to hold on to the territories it occupies.

2) The relationship between water dependency and security is perceived as absolute. This is especially critical where two or more mutually antagonistic actors compete for the same water source, as in the case of Jordan and Israel.

These two features alone make hydropolitics an especially volatile security issue in the water scarce Middle East, particularly where Jordan and Israel are concerned.

Water is presently a source of concern and tensions among the key regional actors, not only Israel, Jordan, and Syria, but Turkey and Iraq as well. Hydrological projects have been an important channel for the expansion of Soviet influence in the Middle East, most recently in Syria, Iraq and Ethiopia. All of these Middle Eastern countries fall into one or the other superpower camps, and Turkey anchors NATO in Southwest Asia. The potential for water-related conflict is increasing at a time when the atmosphere has changed significantly, linking water as an "issue trigger" to other events that have caused a burgeoning of hostile feelings among Middle East riparians.

The region (and most particularly, Jordan and Israel) suffers frequent occurances of drought: in 1984, Jordanian supplies for irrigation dropped by 20% and in 1985 by as much as 50%, and in some parts of the country water rationing continues; in 1983, more than 200 wells dried up in Israel and in 1984 the Water Commission cut allocations to farms by up to 25% and recommenced water rationing in 1986[4323]; there is growing social and political instability; the entire region is awash with an unending stream of arms; the civil war in Lebanon, the Iran-Iraq war, the spread of radical movements of all persuasions has further poisoned the region's political scene; and the *Intifadah* has intensified Israel's efforts to use its control of the West Bank's water resources as a weapon for subduing the uprising.

By controlling the use of water, Israel reinforces its de facto exercise of sovereignty over the occupied territory. Palestinians are fobidden to dig new wells or repair old ones. Palestinian wells have an average depth of 70 meters while wells drilled by the Israeli settlements average 300 meters to 400 meters in depth, resulting in about one-third the level of salinity and a much greater productive capacity. In the presence of a deep proximate Israeli well, the shallow Palestinian well dries up and is not permitted to be replaced or improved. The net result of this policy, according to a 1981 statement by Meir Ben Meir, Israeli's Water Commissioner, is that the per capita use of water by Israeli settlers is at least five times greater than West Bank Arab use. Other water related controls such as prohibiting Palestinians from farming after 4:00pm and forbidding the cultivation of certain crops while extending various advantages - including water subsidies - to the Israeli settlers enables Israel to use water as an instrument for establishing and maintaining control over a majority of population in the interests of a minority group. Since the Intifadah, Israel has been even more stringent in using its restrictions on the use of water in the West Bank (and Gaza) as leverage against the uprising[4322,p69,4496].

What these situations and events signify is that as Jordan's and Israel's water needs grow in the face of diminishing resources, unless new sources of water in large quantities become available, water will assume increasing primacy as a strategic factor in the regional policies of these two riparians. It should be recalled in this context, that both Jordan and Israel are at the "water-barrier", that is, they are consuming over 100% of their water supplies, and of necessity are tapping into their strategic reserves. This situation raises the question of the extent to which Jordan and Israel will be motivated in their foreign and strategic policies by hydraulic imperatives.

The obvious general answer is that the hydraulic imperative will increase in inverse ratio to supply and in direct ratio to demand. The specific state of affairs of this situation at any given time will determine the question of conflict, but the possibility of confrontation will be high.

5.6 Strategic Issue Linkages: Jordan, Israel, Syria

There is presently being conducted a set of secret negotiations between Jordan and Israel, with American technical assistance and mediation, that encompasses and links the most substantial water-related strategic issues between Jordan and Israel and between Jordan and Syria. These exchanges concern the Unity Dam and the intake tunnel of the EGMC and concurrently they draw together and impinge on the following critical issues:

1) Whether Israel will obstruct the construction of Unity Dam on which Jordan is pegging much of its future development and water security.

2) Jordan-Syrian relations, particularly whether Syria will agree to a Jordanian-Israeli accord on Unity.

3) Future guaranteed allocations of Yarmuk water among its riparians.

4) Jordanian-U.S. relations, as an ancillary issue, depending on the outcome of the U.S. mediation and what follow-up role the U.S. will play.

5) Syrian-US relations, as another ancillary issue, depending on whether the US mediation extends in some form to Syria and, if successful, can be used to enhance by a few notches, American influence in Damascus.

6) The potentiality of Turkey assuming a pivotal role in the hydropolitics of the region.

Because of the importance of each of these issues per se, and because of their interconnections, they constitute - cumulatively - the principal strategic regional water problems for Jordan. The future issues of importation of water from Turkey and Iraq are subsumed under these rubrics because both Syria and Israel will have to agree not to sabotage the water pipelines or to exact prohibitive transit tariffs if such a project is to be feasible. Without an accord on the issues under current negotiation, it is highly unlikely that Jordan can be assured a safe pipeline of water in the future.

Since these negotiations are considered to be highly sensitive and are therefore secret, little detailed information is available. However, some accurate intelligence has been garnered, and though meager, is very significant*. Moreover, each of these issues has a history going back to the Johnston Plan, a common linkage among them. Piecing together these fragments of information and applying their history to the results allows some tenuous but logical deductions to be made.

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* Information concerning the negotiations has been obtained from various confidential sources.

However, first, certain assumptions concerning the negotiations that are being bruited about must be dispensed with. "Secret" talks seem inevitably to generate speculations which take the form of "scenarios" about the contents and implications of the exchanges. The following is a reasonable synthesis of the most common scenarios being circulated.

An assumption is made that the issue of clearing the EGMC intake tunnel and the construction of the Unity Dam are united in the negotiations. Further, the EGMC issue is perceived as containing the key to unlocking the Israeli impediment to the Unity Dam. If an agreement could be struck over the clearance of the intake tunnel whereby Israel would receive perhaps 70-75 mcm/year from the Yarmuk, then Israel would in return allow Jordan to dredge away the rocks and silt bar obstructing the canal intake, and would be receptive to a deal on the Unity Dam issue at the same time. A variation is the unlikely conjecture that Israel under US pressure would allow both the tunnel clearance and the construction of the dam in return for more Yarmuk water. Another underlying assumption is that because Syria's water needs would not be adversely affected by such an arrangement but would on the contrary be better served, Syria can be persuaded by various inducements of aid to drop any political antipathy it might have toward a Jordanian-Israeli deal.

Some of the conjectures that shaped these scenarios appear on the surface to be credible, but in fact they are off the mark for several reasons:

1) Two separate (but probably linked) negotiations are being conducted, one over servicing the canal intake, the other over construction of the Unity Dam.

2) The silt bar that built up in front of the intake was quietly removed in 1984 under U.S. mediation. There is no longer a small island of silt at the entrance to the canal. Of course, silt builds up requiring annual maintainance. Although the intake needs servicing at present, the silt has not reached the proportions of the 1984 obstruction.

3) The remaining EGMC issues are annual maintenance and the matter of removing the rocks that accumulate on the Jordanian side of the river, and the question of retension or removal of the rocks placed by the Israelis to their advantage in relation to the water flow.

4) Jordan is conducting talks simultaneously with Israel, through the U.S. mediation, and Syria, directly, over the Unity issue and the Israeli negotiation.

The EGMC. As regards the EGMC, these negotiations were facilitated by the 1984 agreement permitting the dredging of the silt bar. They are focused exclusively on the issues of keeping the intake clear and on

removing both the Jordanian and Israeli rocks which Jordan claims diverts the river flow in (small) favor of Israel. That these seemingly uncomplicated issues have had to be bargained over for so long reflects the ultra-sensitivity and difficulty attending any Arab-Israeli political exchanges, so long as the Palestinian and other Arab-israeli differences remain unsettled. This negotiation is now close to agreement on the technical questions and approaching conclusion on the political issues. The chief problem is how much additional water Israel will receive from the Yarmuk.

The Unity Dam. The Unity Dam talks are much more complex, strategically and politically more significant, and more arduous to conduct than the EGMC negatiation. They involve two sets of simultaneous negotiations among four actors, including the mediating role of the U.S.. For these reasons and because of the magnitude of stakes involved in Unity as compared to those in the EGMC problem, it would have made no sense to combine the two issues in a single negotiation. That would have placed Unity at the mercy of some relatively trivial obstructive matter integral to EGMC servicing. On the other hand, a seperate successfully concluded agreement over the EGMC could have a salutory impact on the Unity talks. Moreover, a seperate Unity transaction is consistent with the incremental, step-by-step, one-doable-issue-at-a-time, approach that has characterized other Arab-Israeli negotiations.

The Unity talks are more shrouded in secrecy than the EGMC discussions, and therefore less is known at this juncture, except that an agreement is not yet in sight. Also, the Unity and EGMC negotiations share a common facet, that of an enlarged water quota for Israel. It is probable that the issue of allowing more Yarmuk water to go to Israel, though relevant to both talks, is being dealt with primarily under the Unity Dam negotiation because it would be a more useful bargaining chip in this context, and if built, Unity will control the flow of the Yarmuk.

Israel most probably wants between 60-70 mcm/year. Some sources place the figure at 70-75 mcm/year, but going back to the April 1984 public comments of the Israeli Water Commissioner the 60-70 mcm number is probably more accurate. This quantity is supported by the fact that the total amount of water available for downstream consumptive use from the Yarmuk would not support a guaranteed average amount much in excess of the smaller figure. Moreover, if Israel is given an allocation considered by the Syrian leadership to be too advantageous, Syria could take unilateral steps to reduce the flow to both Jordan and Israel, and if extremely displeased could abrogate the 1987 Unity Dam agreement with Jordan. Such actions could bring the parties into a military confrontation. The Americam mediators do not want the ire of Syria aroused over the EGMC matter or to have the negotiations sunk under the weight of unacceptable demands made on Jordan, and so are encouraging modest demands on all sides.

One factor that lends urgency to the weight already given the Unity negotiations is the stated determination by Jordan, backed by Syria, to build Unity Dam whatever the outcome of the talks. Indeed, preliminary

construction has already begun. Objectively, given Jordan's water situation coupled with its development requirements, the Unity Dam is indispensible to Jordan's welfare. Except for a coercive seizure of its main water resources by another party, this particular segment of Jordan's regional policies is driven by hydraulic imperatives. To the extent that Jordan's water issues crosscut other regional policies -- and, as evidenced, significantly so -- they too are a function of Jordanian hydropolitics. When one considers that King Hussein has indicated that a serious threat to Jordan's water resources is one of the few issues on which he could be compelled to fight Israel (or, as a logical corollary, for the same reason to engage Syria), then the potential for conflict over the Unity Dam issue becomes apparent. No party is more aware of the stakes that Unity represents than Jordan; hence the lengths to which Jordan is going to achieve a negotiated resolution. Without Unity, Jordan's economy and its unemployment picture would significantly worsen. The country's domestic political stability would be seriously threatened, especially if the consequences of a failure to build Unity Dam were to hatch a radical internal political or religious movement.

Syrian Discussions. This aspect of the Unity Dam negotiations is also under very tight wraps. Little more is known other than the obvious: that Syria has legitimate interests (codified in the 1987 treaty with Jordan) in any transactions concerning Unity, that in addition to being obliged by treaty, politics, and circumstances, Jordan is talking to Syria because it also wants Syria's support for its position; finally, since Syria will not negotiate with Israel, Jordan must hold bilateral discussions with each negotiating partner. (Speculatively, it is possible that the U.S. is playing an informal mediating role with Syria vis-a-vis both Jordan and Israel, as the negotiating conditions dictate).

What this information reveals is that there can be no Jordanian-Israeli arrangement over Unity Dam without Syrian compliance. Syria has several unilateral options, all of which could produce a military confrontation unless the terms of an Israeli-Jordanian agreement were satisfactory to the Syrians. As indicated, for Jordan the worst action Syria could take would be to back out of the 1987 Unity agreement, reassert its previously hostile attitude, and impound a considerable amount of Yarmuk water for use in Syria by means of a series of strategically placed small scale side-wadi dams. Syria had been threatening the latter deed for two or three years before signing the accord with Jordan.

The Syrians had drawn up a plan for the construction of twenty small catchment dams that would have impounded considerably more Yarmuk water for irrigation and power in Syria than the allotment under the 1987 Unity Agreement. The latter accord allows a compromise of seven such dams. There have been reliable reports that the Soviet Union had agreed to make funds and technical aid available for the original twenty dam project, so Jordan had to take the Syrian threats seriously and to be

generous toward Syria's demands[4484,4486]. At the same time, the fact that Damascus did agree to the terms of the 1987 pact when it could have gone ahead with its unilateral planning with Soviet aid indicates the political and economic importance Assad accords the Unity project with its unavoidable Israeli negotiation. Another important reality is also demonstrated by Assad's action: Syria is not adamantly opposed to regional or multilateral arrangements over water.

While those pre-1987 threats were in retrospect negotiating maneuvers, if Syria were to respond to a Jordan/Israel Unity accord by significantly constricting the Yarmouk's down-stream flow, such an action would court an almost certain hostile response from both riparians, probably in the form of pre-emptive strikes from the Israeli side.

Where Syria and Israel are concerned, it should be borne in mind that though it seems improbable that Israel would attack Syria over a few Mcm of water, there is an influential and persistent Israeli faction that advocates a pre-emptive destruction of Syria's military capacity on any even remotely plausible issue; water would be more than a slight issue. Assad's vow of achieving strategic parity with Israel has strengthened the pre-emptive faction. Also, a successful strike would be popular in Israel, and (according to some Egyptian and Jordanian officials) it is not likely that Egypt or Jordan would go immediately to war with Israel over such an attack unless the Israelis misplay their hand[CI] though that act could drive a stake through the heart of the Camp David Agreement. The first response would be a vigorous call to the superpowers to call off the Israelis. If that effort did not succeed, Jordan especially, and the rest of the Arab states would be under strong pressure to react, and the danger of an outbreak of general hostilities would be great.

This scenario makes no sense unless, of course, Syria is prepared to go to war on at least two fronts: Israel and Lebanon, with an angry government in Amman. While Syria does have real leverage in the matter, the exercise of its options is limited by the political and strategic risks involved and must therefore be carefully measured if a confrontation is to be avoided. Otherwise, the danger of a serious water-driven conflict becomes very high.

But Syria need not take the situation to the brink of war into order to gain its way. President Assad also has the choice of doing nothing -- simply stonewalling. He can stall any construction of Unity on the Syrian side of the dam site until Jordan is able to negotiate terms satisfactory to Syria. The backdrop to such a demarche would be the spectre of the other options, and the maneuver would probably be accompanied by a stream of propaganda and a lot of diplomatic pressure. This, or some variation, is the most probable Syrian reaction to an agreement unacceptable to President Assad. It fits Assad's style, and the current circumstances on the ground. In the final analysis, the two most compelling Syrian factors in the situation are that Assad does not want a war with anyone and he does want the Unity Dam to be built. He did sign the 1987 treaty, and he has obviously agreed to the Jordanian-Israeli talks, and he is listening to Jordan for the present. But a critical variable in an analysis of these negotiations is Assad's

implacable enmity toward Israel, which is fully reciprocated and has been deepened by Israel's annexation of the Golan, giving it control of the Jordan headwaters. This variable could alter any calculated outcome.

As potentially important as any other Syrian factor in the Unity negotiations is the looming issue of the Euphrates River and the pending negotiations between Syria and Turkey. The Euphrates is Syria's most important surface water resource, and as a middle riparian to Turkey's upper riparian position, Syria is at a status disadvantage. In the same way that what happens over the Yarmuk determines Jordan's future, so too what transpires over the Euphrates determines Syria's future. Hence Syria's vulnerability. Assad does not want the two issues coupled - the US could possibly be that link -- and can therefore be presumed to desire a timely fruitful result from the Unity negotiations. This circumstance is further evidence that Assad, despite his antipathy for Israel, and being a superlative pragmatist, is willing to deal over Unity. An interesting sidelight is that Syria, while adopting the legal tenet of absolute sovereignty on the Yarmuk, will almost certainly be driven by its middle riparian status to adopt the principle of absolute integrity regarding the use of the Euphrates.

Another facet of Turkey's link to the Unity negotiations is Jordan's stake in a positive outcome of Syrian-Turkish negotiations over Euphrates water. If the talks fail, or as long as they are in process or abeyance, it is improbable that the water "peace-pipeline" would be built along the proposed Syrian route or that Syria could be counted on not to be obstructive in other ways. Also piping water from Iraq to Jordan will depend in part on how much Euphrates water Syria sends down to Iraq, which is in the first instance a function of how much the Turks pass onto the Syrians. The Iraqis are in the advantageous position of having Tigris River water available, but that river is insufficiently developed to allow pumping of large amounts of water abroad. Iraq has plans for cutting canals between the two waterways, but pumping water from that distance presents problems of construction and cost that make the prospect much less feasible and attractive than the Euphrates scheme.

Jordanian authorities are fully cognizant of the political and strategic dimensions of the Unity affair and of the extreme delicacy of Jordan's position as a middle and lower riparian to its neighbors(CI). Also, Jordanians always take Israel's overwhelming military superiority as axiomatic. They are concerned that nothing be done to unravel the 1987 Unity Dam Accord with Syria or that Israel be allowed either an excessive water quota or to frustrate the dam project. Above all, Jordan wants to avoid hostilities(CI). Thus, despite King Hussein's disgust with this administration's policy on the peace seeking process, he wants and needs the good offices of the US in these negotiations.

5:7 The International Politics of the Unity Dam

For the sake of rounding off the perspective, it would be useful to examine the principal apparent gains for each actor in a successful Unity Dam negotiation.

Jordan. Construction of the Unity Dam constitutes Jordan's main hope for a politically stable and viable socioeconomic future. Despite the built-in limitations of Unity, there is no other comparable option. In Jordanian planning, Unity is the pivot on which future development will turn because the Unity project will give Jordan the control over its major surface water resource that it urgently needs but has never had, and the Yarmuk is the only major source of fresh surface water left to exploit.

Politically, the Unity project is also in large measure the government's insurance against domestic political instability inspired by economic stagnation which would be Jordan's fate without the Dam. Moreover, a settlement with Israel would remove a significant source of friction and give stability to that part of the Jordanian/Israeli border. King Hussein's withdrawl from the West Bank, giving up any claim to the its water resources, underscores the centrality of the Yarmuk and the Unity Project to Jordan's planning of the future. Jordan must therefore negotiate with Israel (and keep talking to Syria) until a workable arrangement is reached. There is no other viable choice. Military action, except *in extremis*, whether alone or as part of an alliance, could not succeed and would create more problems than it would solve.

Israel. Despite the constant possibility, in certain conditions, of an Israeli preemptive tactical strike, in reality Israel wants a considerable increase in its share of Yarmuk water without antagonizing Jordan and Syria to the point of hostilities. Israel's military hegemony in the region together with its powerful influence in the US and its controlling status on the Jordan River gives that nation a latitude in the negotiations not enjoyed by the other two riparians. Essentially, this means making *de jure* Israel's *de facto* withdrawal of water in excess of the Johnston quota. The Israelis and Americans believe that this objective is best reached through a negotiated agreement with Jordan that would give Israel a guaranteed annual allocation, presumably in the neighborhood of 70 Mcm. This amount is considered just affordable by Jordan[CI].

Israel could continue the status quo under which it withdraws amounts of water that reach 100 Mcm per year, justified on the basis of its questionable unilateral interpretation of the Johnston Plan. But that policy would become a constant source of friction with Jordan and could, in circumstances of prolonged severe drought, coupled with other ongoing tensions, lead to a military confrontation. An agreement with Jordan would not only give Israel the water it wants, but would also stabilize the river border with Jordan. Finally, it has historically been the case that when Israel has acceded to an action desired by the US, even when that action is in Israel's own best interest, the Israelis have been able to extract from the US extra economic and military aid as a reward.

If the Israelis (and the Americans, for that matter) play their Jordan hand badly, they stand to lose much despite their riparian and military advantages. Creating a water based political or economic crisis could destabilize Jordan, perhaps topple King Hussein's regime, and radicalize the government. Not only would such an outcome add significantly to the forces of destabilization in the region, but Israel could be faced with a radical and militarily hostile neighbor.

Syria. The advantages that Syria could conceivably win from successful negotiations would when added up be worth while. These possible gains include more water and electricity, political credit in the Arab camp, more US economic cooperation, more political influence both with Jordan (not to mention a large *wasta*) and in the "peace making process", and a small improvement in its position vis a vis Turkey.

When combined with Damascus's current 65 Mcm/yr withdrawal of Yarmuk water, the Unity Dam supplement would give Syria a total of about 100 Mcm/yr., an amount within hailing distance of Syria's Johnston Plan quota. Moreover, Syria would receive three quarters of the 15 MW of hydroelectricity the dam would generate at little cost to Damascus since Jordan will assume most of the cost of producing the power. Syria will have strengthened its claim to a leading role in Arab politics by demonstrating that no significant negotiation with Israel can occur without taking Damascus into account. By not obstructing an important US mediated agreement, Syria could possibly persuade the Americans to cease their opposition to Syrian aid from such international agencies as the World Bank (on whose loans Syria has been nearly in default each year since 1981) and the IMF, and even pave the way for more US economic assistance.

If Unity is built, Syria would in no way diminish its advantage as upper riparian to Jordan, on the contrary, its influence is likely to be enhanced in Amman, unless Assad overplays his hand or other political issues poison the fragile relations between Amman and Damascus. Finally, the hydrological and political gains from Unity would in a small way strengthen Syria's hand in its negotiations with Turkey over Euphrates water. In hydropolitics, incremental advantages matter.

Turkey. Turkey's position must be discussed briefly in this context because Turkey looms important in the background of the Jordan-Israel-Syria talks, because of her links with the negotiants and the mediator, and because Turkey's good offices and influence are available not only to the US but to the principals as well, though the latter, particularly Syria, are not likely to make use of them.

Prime Minister Ozal has been actively pursuing a larger Turkish role in regional affairs as a means of improving the country's economic position and political influence. He has promoted the image of a man of peace, having offered to mediate a cease-fire between Iraq and Iran, and he initiated moves to improve Greek-Turkish, and Cypriot-Turkish relations, and in a humanitarian gesture he took in Kurdish refugees from

Iraq. He has also (holding the whip hand) adopted a reasonable posture toward Syria and Iraq in regard to sharing Euphrates water. Ozal has so far played this international role with skill. He has avoided becoming embroiled in the Arab-Israeli conflict and has steered well clear of the web of inter-Arab politics. He cannot take the Turkish public into either of these entangling areas. But with these caveats, there is a receptivity on the part of the Turkish government to make positive contributions to the settlement of the region's problems. This plus factor is, to be sure, somewhat diminished by historical animosities and mistrust by the Arabs dating back to the Ottoman hegemony (intensified in the case of Syria over Turkey's annexation of Alexandretta, now Hatay, by Ataturk). However, Turkey's image has improved, judging from the current state of her relations with most of the Arab states and Iran.

Thus, within stipulated limits, Turkey is available for possible cooperation or advantage by the US or any other party to the negotiations. Turkey's gain would be enhanced prestige and influence in the region and the West as a NATO ally with whatever concomitant economic rewards can be gleaned from cooperation. There is also the prospect of improving Turkey's stature in the US Congress with possible increases in American military and economic assistance. All at relatively small risk to Turkey.

The United States. The Unity Dam negotiations offer the US an extraordinary opportunity to advance its Middle East interests and its pursuit of peace in the area. Although the inherent volatility of the water issue and the seemingly unmitigated enmity of some of the actors could overwhelm the American mediatory venture, if the US plays its hand with great finesse, flexibility, equability and persistence it could emerge from the Unity negotiations having achieved a major milestone in its Middle East policies.

Because superordinate interests are at play in the Unity talks, the chances for a desired outcome are enhanced (but not guaranteed) and the possibility of parlaying a successful result into further exchanges over other issues is created. It will by now have become amply clear that in the hydropolitics of the Middle East, every main issue is eventually connected to all other issues. There are several factors intrinsic to the present circumstances that US mediators can use to good advantage.

Foremost, all the key actors, except Iraq, are presently talking. Not only talking, but exhibiting signs that they are willing to persist until the effort succeeds. Moreover these talks can be taken as evidence that the parties' interests in water issues are so large that they would not necessarily reject multilateral exchanges for the settlement of water issues under the right conditions.

Jordan, Israel and Syria have in common the necessity of sharing the waters of the Yarmuk. But there is great disparity among them in their degree of need, their riparian interest and status, and in their military capacity. Given the variance in need, riparian position, and the intense interest among the parties, if the three actors were roughly

equal in military power, then the conflict potential over the Yarmuk would be very high. There would very probably be no negotiations in these circumstances. However, in this instance, the congruence within one of the parties (Israel) of strong interest, advantageous riparian status, and most importantly, more military strength than the other two riparians combined, reduces (but does not eliminate) the prospect of conflict. Expressed in the form of a simple matrix, with the riparian having the highest total being in the strongest relative position to exploit its political and hydrological interest or to negotiate consumptive use, the current situation would look like this:

Fig. 5.1

INTEREST-POWER RIPARIAN CONFLICT MATRIX*
(scale: Interest and R.S. = 1-5; Power = 1-10**)

	YARMOUK/UNITY DAM			
	Interest	Rip. Status	Power	Total
JOR	5	3	2	10
SYR	4	5	3	12
ISR	4	2	10	16

* The results of this model are gross representations only, intended to be illustrative of the relative positions of the actors in the Yarmuk negotiations.

** It is assumed that these factors in this case are unequal, with power, perforce, given the greatest weight.

Two other factors also help to inhibit, for the time being, a confrontation over the Unity Dam negotiations. The least important is the most intangible: a general disapproval in international opinion of military conflicts over water, particularly where one of the belligerents has overwhelming power. This element is reinforced by a generalized sense in world opinion that it is illegitimate to attack water targets, especially in water-scarce regions. Although this conflict supressant has been considerably eroded in recent years, as evidenced by the Israeli attacks on the EGMG, world opinion still matters just enough to the Yarmuk's users to act as a secondary restraint. The more important factor is, on the other hand, a powerful retardant: none of the primary actors involved wants a war with any of the others, nor does the facilitating party, the US, want hostilities among them.

5.8 New Approaches

Thus, a temporary condition favoring a productive US mediation exists; that is to say, a condition wherin the superordinate hyrdaulic goals of each actor have come into a frail but sufficient balance as to override the countervailing forces of hostility which have sustained a state of confrontation among them. At the same time, it must not be assumed that the deep-seated mistrust and enmity among Jordan, Israel and Syria has been dissipated. It could reassert itself and destroy the fragile balance of superordinate interests at any moment. It is therefore critical that the US make the most of this opportunity to mediate an agreement over Unity.

Despite the distrust and anger toward this administration felt by Jordan and Syria, the US is nevertheless in the unique position of having real influence not only among all three Yarmuk riparians, but also with one outside regional actor, Turkey, who possesses potential influence vis a vis Syria. Beyond Syria, Turkey has water to export all the way to the Gulf if Prime Minister Ozal's intentions are fulfilled, and is the only regional actor that has good or correct relations with all three parties. The US, acting as a mediator (or facilitator)-benefactor, is accepted by all the parties as essential to the negotiation. All the problems involved have a history tracing back to the Johnston Plan, in which the three discussants were participants.

In these circumstances, it is just possible that the US could, within the current realities, configure a new mini-Johnston Plan limited to the use of the Yarmuk which could effectively serve as a model for other water agreements in the region. However, it must be stressed that the new plan should in no way be perceived as or constitute a resurrection of the old Johnston Plan. Drastically altered conditions have made that plan obsolete. An attempt to revivify it in the current circumstances would be tantamount to opening a can of maggots: old conflicting claims and recriminations would contaminate if not destroy the negotiations.

But a negotiation for a new scheme along these lines is feasible and could take advantage of the technical and hydrological aspects covering the Yarmuk in the original Johnston Plan which were well established and even temporarily agreed upon. A new plan would have to focus on the central issues of building the Unity Dam and an increase of some 60-70Mcm/yr of Yarmuk water to Israel, together with arrangements for objective monitoring and for submitting future changes or disputes to negotiation, mediation or arbitration. The 1959 Egyptian-Sudanese Nile Treaty could serve as a successful precedent here.

The difficult problems would once more be geopolitical. On the one hand the mistrust and hostility among the negotiants is, if anything, more intense now than in 1955, but on the other, there are certain factors not present before that could be manipulated in favor of an agreement. The water and hydropower needs of the parties is much greater than in 1955 with less time available to work out unilateral solutions,

which, given the complexity and inter-riparian nature of the problems, could not be more than stopgap. With Unity in place and with an agreed workable arrangement over the issue of the intake to the EGMC it would be simpler to detect cheating downstream and any monitoring task would be relatively easier; everything would be smaller scale, more closely defined, and putatively more manageable. Israel's military hegemony is now proven whereas in 1955 the question was still moot to the Arabs, so there is little liklihood it will be challenged without deep cause. The near-completion of the GAP Project on the Euphrates in Turkey makes Syria considerably more hydropolitically vulnerable and thus perhaps potentially more sensible of America's leverage with Turkey. The Syrians would welcome a more friendly US posture if the political price were not considered exorbitant, especially since, in purely hydrological terms, Syria does not stand to lose in any deal cut by Jordan and Israel on the Yarmuk.

Admittedly, in the current ambience of the region - the pervasive anti-American sentiment found among the citizens (especially the younger generation) of most Arab states, the failure of the latest US peace initiative, the new uncertainties and anger wrought by the *Intifadah* and Israel's repressive response, among a myriad of problems -- the chances for a successful American-mediated agreement on the Yarmouk are not good. But, as demonstrated, there does exist now a small but genuine opportunity that if siezed could have a significant positive impact on US interests. This would, moreover, not necessarily be one of those Arab Israeli negotiations that have to await the outcome of American or Israeli elections, or a full settlement of the Arab-Palestinian-Israeli problem.

America's position as a facilitator of peaceful negotiations would be enhanced, a potential source of serious friction would be removed, and most significantly, a basis for further US sponsored negotiations, albeit in a limited arena, would be laid. The US must, as usual, be prepared to offer both material and political benefits to make any accord palatable. Assuming, on the basis of the evidence, that the principle of superordinate interests is operative here, then a successful outcome to the Unity negotiations would improve in some degree the atmosphere for other negotiations in which any of the actors become involved, whether in the Jordan or Euphrates Basins.

The implications of failure are conversely very serious. Sometime between 1995 and 2005 unless there is an effective arrangement for sharing the water of the Jordan River Basin, especially the Yarmuk, and unless consumption patterns in Jordan and Israel change, there is a high probability that Israel and Jordan -- and the West Bank -- will face acute and progressively worsening perennial water shortages (see Fig. 1.4, p. 17). The potential situation could be likened to one in which the three areas were to run out of all renewable sources of fresh water by 2005, especially if severe drought conditions strike. This does not mean literally that the water will disappear as though a tap were turned off, rather what is being described, dramatically to be sure, is the

affect of the severe water shortages being predicted. As an *affect*, the claim should not be dismissed. All of the problems of scarcity, including potential conflict, would be significantly magnified.

In such a circumstance, the Jordan River system holds the greatest prospect for conflict. If indeed failure to achieve an equable apportionment of the Yarmuk's water through a Unity Dam agreement forces Jordan and Israel to give water a prime role in their strategic regional policies, Jordan can only feel threatened in such a situation. Being in a much weaker riparian and military posture, Jordan can bolster its position only through a network of military linkages to other states in the region, thus increasing the chances that any ensuing conflict would overflow the Jordan basin.

Where water is concerned, changes in habits of consumptive use are extremely difficult to effect quickly, even in the best of conditions. The obvious way to ensure that Jordan and Israel will not fall into water-driven hostilities in the future, would be for them to restructure their economies so as to alter present patterns of consumption, particularly by cutting back on agriculture (a 30%-50% reduction would just about solve the water scarcity problem) and emphasizing the production of surplus capital to pay for the import of foodstuffs. However, deeply entrenched and interrelated ideological, security and symbolic considerations make the necessary political decisions virtually impossible at present in both Jordan and Israel (4322 pp.68-9), certainly not with the nimbus of mistrust and animosity that overhangs Arab Israeli relations and that can be dissipated only with an equible settlement of the Palestinian issue. A decade or a decade and a half is barely enough time to make basic alterations and adaptions in a country's water use.

Without Unity and the completion of other hydrological projects in Jordan, water problems will grow increasingly acute. As they do, they will become serious domestic political issues, no longer perceived by the public and politicians as primarily technical matters best left to technocrats. The sectoral competition for water between agriculture and M & I will grow more intense with significant economic and political implications for Jordan's system of rule. Water problems will inexorably impact on other issues, including foreign relations, and the consequent domestic tensions will make potential international disputes all the more difficult to settle without confrontation (3235,pp.195-6). This is the dark backdrop against which the Yarmuk negotiations are being conducted.