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Israel: Water and Its Implications for Middle East Peace

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An Intelligence Assessment

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An Intelligence Assessment

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Key Judgments

Unlike most other nations in the world, Israel has inventoried its natural resources as a first step in protecting its resource base. Water is a prime example, and Israel has implemented stringent policies to conserve and wisely use it. But, having achieved nearly full utilization of currently available conventional sources, Israel now must make some difficult decisions—either redefine current water allocation priorities, make enormous and continuing investments in nonconventional sources, or seek water elsewhere.

Some sources of water in neighboring Arab countries are not fully developed. Israel could gain access to these supplies by working out water-sharing agreements or by appropriation via annexation or military force. The decisions that Israel makes concerning water resources will greatly influence its position in any international negotiations affecting neighboring areas and its posture relative to annexation as a continuing policy:

- Israel can be expected to claim as much water as possible from any Jordanian water control projects constructed on the Yarmuk River—the last surface flow in the Jordan basin that is not fully utilized.
- In any Palestinian autonomy negotiations, Israel will not surrender or compromise any of its currently held water rights in the West Bank. Formal annexation of the West Bank would assure the Israelis of continued control over those water resources.
- The nearest available foreign water source in the region is the Litani River in southern Lebanon, which potentially could provide a 30-percent increase in Israel's present water supply. This, of course, provides an added incentive to Israeli control of southern Lebanon.

All of the options open to Israel in dealing with the water problem will affect the United States. The political-military issues raised in gaining or keeping access to water resources will have a direct impact on regional peace and the negotiating process in general. If the Israelis opt to solve the water problem by developing nonconventional supplies, they may ask the United States for increased aid.

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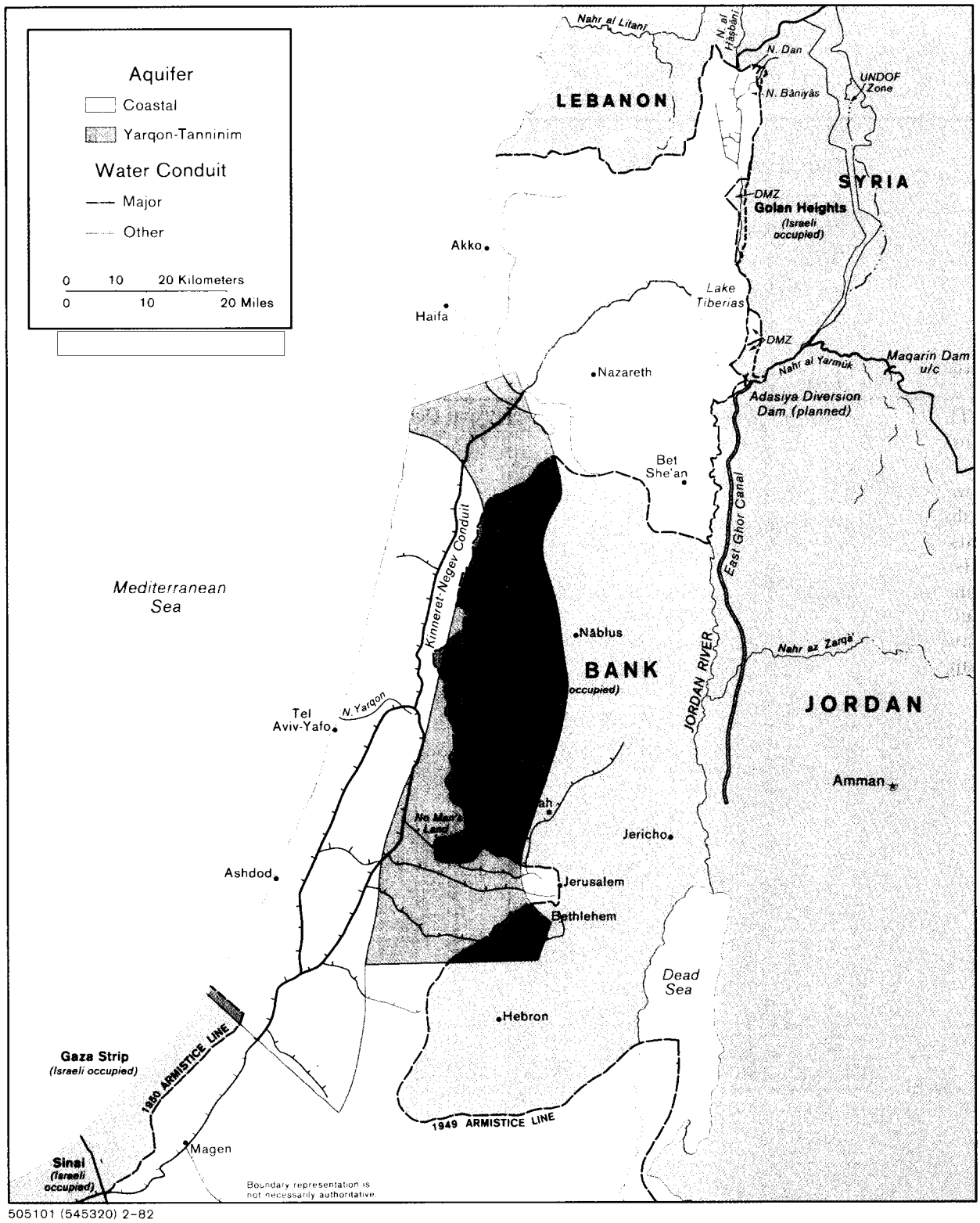

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Israel: Water and Its Implications for Middle East Peace

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The Israeli Government has long recognized that the nation's water resources are limiting factors in the country's agricultural development and industrial and urban growth. The Israelis have considered protection and development of this resource an important national security concern. The task before Israeli planners, therefore, has been not merely one of creating a system of national distribution of this extremely scarce resource but also one of developing a system that maximizes recovery of water.

The advanced systems that the Israelis have employed to conserve and efficiently utilize water have been stunningly successful in minimizing the effects of water shortages. Israel's accomplishments stand in sharp contrast to the lumbering progress exhibited by its neighbors in water resource management. But Israel is now at a decision point. Its successful water management policies have resulted in nearly full utilization of immediately available water resources, and its further economic growth demands either new approaches to water management to stretch its current supply or access to other sources, or both.

The Current Water Balance

Israel's water is drawn from several conventional and nonconventional sources. Precipitation and surface runoff annually replenish river, lake, and groundwater sources, but the seasonality and distribution of the annual increment presents problems. Nearly all of the rain falls from October to April rather than in the summer crop season, and most of it falls in the northern hills and mountains where good cropland is scarce and population is not as dense. Moreover, the amount varies greatly from year to year, from a low of 400 million cubic meters in one recent drought year to a high of 2.4 billion cubic meters in the rainiest year. This variability leads Israeli officials to calculate a mean annual replenishment rate of about 1.5 billion cubic meters, the maximum quantity of water from conventional sources that can be utilized in any one year without endangering future supplies.

Several wastewater reclamation and desalinization plants supplement these sources and contribute as much as 100 million cubic meters annually to Israel's water supply. However, these projects are too expensive to be relied on to greatly alleviate growing Israeli needs.

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Most of Israel's water sources have been integrated into a national water system. Its three main components are the upper Jordan River and its tributaries, including Lake Tiberias, and two large underground aquifers. The smaller of the two aquifers is composed of sandstone and lies wholly within Israel's borders along the Mediterranean coast. The other is limestone and underlies the eastern part of Israel proper and the Israeli-controlled West Bank of the Jordan River (see map). The water carrier links the three main components with local and regional water systems and delivers water to the central and southern desert regions of the country where rainfall is scanty.

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The upper Jordan watershed constitutes the major surface and flood water collector, contributing roughly 30 percent of the country's total annual exploitable water supply. The importance of this watershed, however, goes beyond these numbers. During periods of heavy rainfall, excess surface flows are stored in Lake Tiberias, Israel's only natural surface water reservoir. The lake holds about 4 billion cubic meters, but most of the water is too saline for use in the national water carrier. Only the amount between 209 and 212 meters below sea level is withdrawn. Hence, the operational storage volume is only about 500 million cubic meters.

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The two aquifers provide about 55 percent of Israel's annual water consumption, but withdrawals often exceed natural recharge and they must be replenished. It is particularly important to maintain the water table of the coastal aquifer to prevent contamination from seawater intrusion. Besides monitoring

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and controlling water withdrawals, the national water system supplements the unreliable natural rainfall replenishment of the aquifers through artificial recharge. Excess surface water flows not stored in Lake Tiberias are pumped into aquifers via well casings normally used to lift groundwater during the dry season. At the present time, the three pumps that operate in the vicinity of the lake can add 1 million cubic meters per day to the aquifers. If not needed for replenishment, this water can be stored there for future use.

Two smaller aquifers, located in the northeastern part of the country, have also been integrated into the national water system. Another has been discovered in the south beneath the Negev Desert, but pumping from it has been limited until more information can be obtained about its source of recharge and its relationship to the coastal aquifer.

Agricultural Needs

Agriculture currently consumes nearly four-fifths of Israel's water supply. In recent years, however, household and industrial water use has grown rapidly, reducing in relative terms the portion of the national supply available for agriculture, a trend that is likely to continue. With foresight, the Israelis have worked to conserve and maximize use of the water available to the agricultural sector. Since 1965 the amount of water used per area of land has been reduced by 20 percent, thanks to technical advances that have made their irrigation system one of the most efficient in the world; presently, 70 to 80 percent of the water entering the system reaches a crop. By the mid-1970s, approximately 217,600 hectares were irrigated with an average annual water requirement of 5,500 to 6,000 cubic meters per hectare.

Three types of irrigation schemes are employed. As of 1978, approximately 85 percent of the hectarage was irrigated by sprinklers, 10 percent by drip or trickle, and the remaining 5 percent by gravity. Many of the irrigation systems are automated and conserve water through the use of automatic flow-metering valves that control the timing and quantity of water delivered or applied. These computer-based systems utilize a variety of data, including information on water availability, climatic conditions, soil types, and field status reports to determine water distribution. 25X1

Water available to the agricultural sector is ultimately dependent on rainfall. If rainfall is plentiful, extra water allotments may be granted for supplemental irrigation of such crops as wheat, vegetables, and cotton; otherwise, these allotments are not made. When rainfall is scarce, water withdrawals from the aquifers and Lake Tiberias are rationed. Cuts in normal allocations to vegetables and field crops are implemented first. As a last resort, water supplies to the orchards would be diminished because damage to the fruit trees would mean more than the loss of a single year's crop. 25X1 25X1

Water remains a major constraint on agricultural expansion, because total water use is so close to total water potential. So far, the Israelis have been able to forestall major cutbacks in agricultural production by enhancing their already efficient use of water in agriculture in a number of ways: development of crop genetic strains that are salt tolerant and require less water, continued improvement of irrigation techniques, changing cropping patterns, and experimentation with hydroponics. However, the prospects for cultivation of any of their remaining potentially arable 200,000 hectares could depend on how much more can be achieved with water-saving technology in the years ahead. Output from this reserve land resource could reduce Israel's dependence on foreign food supplies and provide additional foreign exchange earnings. 25X1 25X1

Projections

Demands for water are intensifying. By the turn of the century, Israel's water requirements, based on a projected population ranging between 4.7 million and 5.4 million, could total 2.3 billion cubic meters per year, which is significantly higher than the present supply from conventional and nonconventional sources (see table). To handle this growth, the water authority over the next 10 to 15 years plans to augment its annual supply by 500 million cubic meters. Most of 25X1

Israeli Estimated Annual Water Supply and Demand

Million cubic meters

	Mean Annual Planning Data	
	1976	2000
Supply		
Total	**1,612**	**2,112**
Jordan River	490	490
Groundwater	990	1,076
Floodwater	27	91
Wastewater	100	450
Desalinization	5	5
Demand (nonagricultural)		
Total	**369**	**722 to 849**
Household	306	594 to 661
Industrial (excluding brackish water)	63	128 to 188
Available for agriculture	1,243	1,390 to 1,263

the increase (350 million cubic meters) will accrue from wastewater reclamation and, to a lesser extent, from tapping additional sources of groundwater and floodwater. Such augmentation will be expensive. Current estimates call for $1 billion (in 1979 prices) to be spent on wastewater reclamation projects during the next 10 to 15 years. Another $12.5 million will be used to install another pump at Lake Tiberias, which would increase the aquifer recharging capability by 120-130 million cubic meters. Even if these efforts are successful, water allocations to the agricultural sector will not increase appreciably, and to the extent that a deficit occurs in any one year, it will likely be compensated by a reduction in the water allocated to the agricultural sector.

Desalinization, because of its excessive cost, does not figure as a major additional source of water until well after the year 2000. Nevertheless, the Israelis are working to discover cheaper desalting technologies and are currently cooperating with US experts in such a project at Ashdod. A large-scale pilot plant based on an Israeli-developed distillation process is under construction, with the United States providing about half of the project's estimated cost of $25 million. In return, the technology will be made available to US firms on a nonexclusive, nondiscriminatory basis. When completed, the plant will contribute from 6.2 to 6.9 million cubic meters per year to Ashdod's water supply. Because the technology is under development, it is too early to predict the operational costs of producing water at this facility. As desalinized water is too expensive to be used in irrigated agriculture, it is generally allocated to household consumption.

Completion of the projected Mediterranean–Dead Sea canal project will not have a direct impact on Israel's water balance. Although the seawater could be utilized as cooling water in industry, the canal's primary purpose is to exploit the 400-meter difference in elevation between the two seas to produce hydroelectric power. If completed, such a plant could produce about 15 percent of Israel's projected electricity requirements by the early 1990s 25X1

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Water and Middle East Peace

Protection of shared water resources plays a salient role in shaping Israeli foreign policy toward its neighboring nations. A key Israeli goal is to retain access to all water resources that it presently utilizes, a posture that complicates the Middle East peacemaking process. The recent move to annex the Golan may have been motivated in part by a desire to secure the headwaters of the Jordan River. Water rights have become such a sensitive topic that Israel and Egypt agreed in October 1981 to postpone consideration of that topic during their negotiations for Palestinian self-government until agreement is reached on the nature of an elected council to govern the Palestinians living in the Israeli-occupied Gaza Strip and West Bank. Israeli water demands also have contributed to strained relations with the Hashemite Kingdom of Jordan and delayed the construction of water control projects on the Yarmuk River. Israel's need to augment its current water supply could also be a factor in determining Israeli moves in southern Lebanon. 25X1

Golan. Water resource issues probably played a role in Israel's recent decision to push ahead with annexation of the Golan Heights. Only one of the three 25X1

principal tributaries of the upper Jordan, the Dan, is presently within Israeli borders. Inclusion of the Golan region will bring the Baniyas under Israeli jurisdiction, thus safeguarding this critical portion of Israel's water system.

Gaza. Water issues in the Gaza Strip are not as divisive as those concerning the West Bank. The Israelis do not withdraw water from the Gaza aquifer for use in Israel proper. In addition, the rainfall that replenishes the Gaza aquifer falls in Israel, so Israel already controls the amount of water that makes its way into Gaza. Nevertheless, the Israeli Military Government in Gaza has implemented a number of water control procedures to prevent overpumping that would lead to aquifer salinity. For example, it has imposed licensing on well drilling and citrus grove planting and placed meters on existing wells. Its goal is to maintain a water usage level of 70-80 million cubic meters, the normal aquifer recharge level, thus bringing Gaza water use and supply into balance while maximizing water consumption in the Israeli portion of the watershed. One stumblingblock to further progress on the issue of independence for the Gaza is that Israeli negotiators will not agree to any water concessions that could be considered a precedent for resolution of West Bank water questions.

West Bank. Water obtained from the aquifer that underlies Israel and, to a greater extent, the West Bank is so important to the Israeli economy and the population's quality of life that a final resolution of the West Bank's political status is probably not possible unless Israel's water needs are satisfied. One of the rationales given initially for Israeli occupation of and settlement in the West Bank was the necessity to protect and manage this shared source, which provides over one-third of the best sweet water in the Israeli national water system. Because of the danger of seawater intrusion, pumping from the coastal aquifer cannot be increased to compensate for a decrease in water withdrawals from the shared aquifer. Thus, Israel will insist that any settlement of West Bank sovereignty include a guarantee for Israeli use and control of the aquifer. Failure to obtain a favorable settlement could stalemate the autonomy talks or lead to Israeli annexation of this region.

West Bank water consumption is regulated by policies designed to maximize the quality and quantity of water available for Israeli use. Any water resources developed by Israel in excess of pre-1967 Arab water usage levels are reserved for the exclusive use of Israelis in the West Bank. Data on the amount of water consumed by Israeli settlements are not available, but in 1979 it was estimated at about 21 million cubic meters. 25X1

Furthermore, the Israeli Military Government in the West Bank has imposed strict water restrictions on the native Palestinians. For example, an Israeli license must be obtained to drill any new wells or place pumps on existing wells, and Israeli authorities usually closely supervise all Palestinian drilling operations. The Israelis also monitor Palestinian well withdrawals and have imposed maximum limits on the amount of water that can be pumped from existing wells. As a result, Palestinian water consumption has increased little since the Israelis arrived. 25X1

The water resources available to the Palestinians in the West Bank range between 150 million and 250 million cubic meters, but because water rights are considered private property, a regional water system for Palestinian use has not been developed. As of 1979 about 120 million cubic meters were exploited, but even this amount was not efficiently utilized. Irrigation methods are outdated, and water from wells and springs is conveyed to crops by open channels rather than by pipes. As a consequence, more than 50 percent of the water never reaches the crops. Moreover, many Palestinians have not invested in sprinklers or drip irrigation systems, but continue to employ flood irrigation techniques that result in further loss of this scarce resource. If the Palestinians upgraded their water control systems, it is conceivable that they could save 40-50 million cubic meters annually. 25X1

Israeli officials contend that any increase in water use by the West Bank Palestinians must originate from currently underutilized sources. Besides implying that the Palestinians must develop more efficient methods to use the water that they now have (albeit within the confines of Israeli water policy for the West Bank),

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Israeli officials insist that a portion of any water that becomes available from new water control projects in the Jordan River Basin must be allocated to the West Bank Palestinians from the Jordanian share.

Jordan. This demand has delayed Jordanian construction of a storage dam on the Yarmuk River (Nahr al Yarmuk, a tributary of the Jordan River that forms the northern boundary of Jordan with the Golan Heights and Syria) at Maqarin and a diversion weir at Adasiya. If completed, these projects would bring under control the last surface flow in the Jordan River Basin that is not fully utilized. The nations are very far apart on determining how much water should be made available to the West Bank from these projects, and US intermediaries have thus far failed to make any headway on a compromise. Israeli annexation of the West Bank could indefinitely delay a peaceful settlement by further inflaming emotions in Jordan.

The pressing water needs of the region should give Israel and Jordan reason enough to negotiate the West Bank issue in the interest of getting on with the Maqarin Project. The danger is that the long lead-times needed to construct a dam and fill the reservoir (an estimated three to five years) and to build pipelines and canals could make serious water shortages unavoidable in Jordan by the late 1980s. The Israeli move to annex the Golan may stiffen Jordanian resistance to Israeli proposals. But even if a solution to the West Bank problem were to be worked out, Israeli officials would probably still not agree to construction of the Maqarin Dam unless the Jordanians guarantee that the 25 million cubic meters of water that the Israelis now draw from the Yarmuk below the proposed dam site would still be available.

Syria also has a voice in the Maqarin issue, as a major portion of the Yarmuk catchment basin lies in Syrian territory. But from a water resource perspective, its interest is marginal because terrain limits the benefits, other than electric power, that Syria would derive from completion of the dam. Syria is already at odds with Jordan, and because of the recent Israeli moves in the Golan, Syrian cooperation in a project that would benefit those two countries is not likely to be forthcoming.

Southern Lebanon. The limits that water availability place on development continue to prompt Israeli efforts to increase supply. The nearest unexploited water resource in the region is the Nahr al Litani, a river in southern Lebanon which flows largely unused into the Mediterranean Sea. In the past, several international studies have dealt with developing the Litani's waters as a regional resource and determining how they should be shared among the nations involved. As early as 1954 Israel commissioned its own study, the "Cotton Plan," which proposed integration of the Litani and Jordan basins, water sharing (Israel, Jordan, Lebanon, and Syria), as well as compensation to Lebanon "either in money or electric power for net power benefits foregone due to exporting excess Litani water to the Jordan basin." Cooperation among the nations that would benefit from this project is not likely to be forthcoming, given the current nature of Arab-Israeli relations and the chaos in southern Lebanon.

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An Israeli official in 1975 estimated that if the Litani waters were harnessed and provisions were made for ample growth in Lebanese water consumption, about 500 million cubic meters, an increase of roughly 30 percent to Israel's existing water supply, could be diverted to Israel. He estimated that it would take about a year to build a 30-kilometer connecting canal from Dan in Israel to a point about 11 kilometers inside the Lebanese border, where the Litani turns westward toward the Mediterranean. Some Israelis have advocated invading Lebanon to gain control of the Litani as well as the Hasbani River, which is the only principal tributary of the upper Jordan not under Israeli jurisdiction.

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Israel has long considered the Litani a natural security border, and in 1978 invaded the region to end Palestinian raids into northern Israel. Since then a buffer zone connecting Christian partisan settlements has been established along the Israeli border and includes much of the region where the connecting canal could be constructed. If anti-Israeli activities in southern Lebanon were to intensify once again, Israeli leaders, despite foreign opposition, could decide to install a military government there, thus giving Israel physical control of the Litani.

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US Interests

Israel's desired agricultural, household, and industrial water demands will continue to exceed availability for some time, and all of the options open to Israel in dealing with its water problem would have an impact on US-Israeli relations. If Israeli officials tried to deemphasize the role of agriculture in the economy, societal, economic, and political dislocations inside the country could result and affect domestic stability. Since Israel is not likely to give up any of its currently held water rights in the West Bank and will continue to press its claim for water that would become available from the proposed Yarmuk River projects, this barrier to peace with its Jordanian neighbor will persist. Israel's water needs could figure in a decision to move militarily into southern Lebanon, but security considerations would be the main reason for such a move.

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Development of nonconventional supplies is an expensive option. If the Israelis opt to solve their water problems by increasing investments in nonconventional technology, they are likely to request additional financial support from the United States or suggest jointly funded projects like the desalinization pilot plant in Ashdod. At present, Israel receives about $785 million annually in economic assistance from the United States. Israel has discretionary use of these funds; none are specifically earmarked for water supply projects.

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If the United States were to give Israel additional funds for use in developing its nonconventional water supplies, the Israelis would probably not spend them on desalinization ventures unless cheaper processes were discovered. Wastewater reclamation costs can more easily be justified, because they concurrently relieve sewage disposal and concomitant environmental problems. The Israelis will continue groundwater exploration and purification of brackish water, although the cost of the latter option is high in comparison to the quantity of water that could be obtained.

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