

## Israel and the Waters of South Lebanon

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It is reported that on May 11, 1991, the Israeli government announced it could not yield its self-proclaimed security zone in southern Lebanon without assurances that Israel would receive its "share" of the Litani River.<sup>1</sup> This statement--obviously a harbinger of Israel's negotiating position when the question of withdrawal from Lebanon arises--is not so much a new posture as an echo from the turn of the century. About that time, Theodor Herzl and other leading Zionist advocates of a Palestinian Jewish homeland began to press seriously for the inclusion of the Awali and Litani Rivers within their territorial conception of what that entity should be.

From 1901 onward, many schemes were put forth for the distribution and use of the waters of the Jordan system. Those plans that advocated comprehensive system-wide arrangements, most

particularly those representing the Zionist position, encompassed the Litani, the Awali, and the Hasbani; the inclusion of the latter river, because of its relationship to the Dan and Banias which feed Lake Tiberius (or Lake Kinneret), was always adamantly asserted.<sup>2</sup>

In this context, it should be noted that a conjunctive, multi-use, basin-wide, systemic approach--one that reckons all of the waters in the system across national boundaries--has been widely perceived among experts as the most rational and effective means of solving the problems of scarcity and equitable distribution in the Jordan basin system; incidentally, equitable here does not necessarily connote equality. Thus, from a purely technical stance, such plans, whether by Zionists or others make excellent sense--provided all the riparian actors perceive their interests to be best served by such an approach, and trusted one another sufficiently to produce the cooperation essential to make system-wide schemes work. Unfortunately, the reality on the ground has been one of deeply opposed ideological differences, (inter-riparian, secular and sectarian), with consequent profound mistrust all around, and military hostilities which frustrate hope for any ideal solutions in the foreseeable future.

In a water scarce region, The Litani River--which is an entirely sovereign Lebanese body of water whose watershed lies wholly within the borders of Lebanon--has always been very

tempting to thirsty neighbors because of the quantity, quality, and location of its flow. Allowing for wide annual variations, the natural flow of the Litani averages about 920 Mcm/yr, with an adjusted long-term yearly average of around 750-800 Mcm (taking into account evapotranspiration, infiltration, and runoff). The current reported average is somewhat lower, running at between 600-700 Mcm/yr. The waters of the Litani are particularly sweet, averaging about 220 ppm salinity, making its water useable for irrigation of any kind of crop and for drinking.<sup>3</sup>

Given the pace of past development--until the early 1970s the Christian-led government in Beirut followed a policy of developmental neglect in the Shi'i-dominated southern part of the country--and the fact that the river was used mainly for the production of hydroelectricity, the high quality of the river was easily maintained. If future development in the upper and lower reaches of the river emphasize agricultural development, then the river's sweetness will be much more difficult to assure. Because the Litani has never been entirely developed or used to its full potential, there has been a consistent, but variable surplus that has flowed unused into the Mediterranean, especially since the dislocations in southern Lebanon caused by the civil war and the Israeli invasions. It has been this combination of purity and surplus that has attracted the designs of Israel which developed its National Water Carrier System principally for potable rather



than irrigation quality water.

Although the Litani has never been fully developed, it has not been for lack of development schemes put forth by a variety of interested parties. The most persistent plans have involved Zionists prior to 1948 and the Israeli government since that year. The traditional Zionist/Israeli position has been that the Litani is integral to the Jordan River system; this is the premise of all plans from that quarter. As indicated, from the outset of this century, Zionists campaigned for the inclusion of the lower stem of the Litani, or beyond, in the Palestine Mandate. In the 1950s Israel advocated diverting Litani water into the upper Jordan to produce hydroelectricity and for flushing salinity from Lake Tiberius (Lake Kinneret) making it available for further uses.

The three best known plans that consider the Litani to be a part of the Jordan system are the Lowdermilk Plan of 1944, the 1948 Hays-Savage Plan, and the Cotton Plan of 1954. All three plans required regional cooperation; those of Lowdermilk and Hays-Savage called for using about half the flow of the Litani to augment the Jordan and to generate hydroelectricity for Israel and Lebanon. The Cotton Plan, commissioned by the Israeli government, proved to be the most elaborate of the trio. It based its proposals on the assumption of an annual potential surplus in the Litani of some 500 Mcm which was to be utilized in



a 100 km diversion using channels, tunnels, and aqueducts to supply irrigation and electrical power in northern Israel.<sup>4</sup> The notion of using half the flow or more of the Litani was not accepted by the American negotiators of the Unified (or Johnston) Plan of 1955, the most important and comprehensive of all the schemes for sharing the waters of the Jordan basin (and the one that came closest to succeeding), although Israel continued to press claims to Litani water throughout the negotiations.

Table 1

**Development Schemes and Reports for Jordan River System  
(Naff and Matson, Water In The Middle East)**

<u>Year</u>	<u>Plan</u>	<u>Sponsor</u>
1913	Franghia Plan	Ottoman Empire
1922	Mavromatis Plan	Great Britain
1928	Henriques Report	Great Britain
1935	Pal. Land Dev.Co.	World Zionist Organ.
1939	Ionides Survey	Transjordan
1944	Lowdermilk Plan	U.S.A.
1946	Survey of Palestine	Anglo-Am. Comm. of Inquiry
1948	Hays-Savage Plan	World Zionist Organ.
1950	MacDonald Report	Jordan
1951	All Israel Plan	Israel
1952	Bunger Plan	Jordan/U.S.A.
1953	Main Plan	UNWRA
1953	Israel 7-Year Plan	Israel
1954	Cotton Plan	Israel
1954	Arab Plan	Arab League
1955	Baker-Harza Plan	Jordan
1955	Unified (Johnston) Plan	U.S.A.
1956	Israel Ten-Year Plan	Israel
1956	Israel National Water Plan	Israel
1957	Greater Yarmuk(East Ghor) Project	Jordan
1964	Jordan Headwaters Diversion	Arab League

The Lebanese authorities of the newly created Republic of Lebanon were no less aware of the importance to the future of the nation of the Litani as a hydrological asset. Planning began during the Second World War. In 1943, the harnessing of the Litani for hydroelectrical power and irrigation was foreseen in the Bekaa Valley Survey. At the war's end, the Council of Ministers commissioned a Six Year Master Water Plan which encompassed the Litani, Orontes, Yarmuk, Qasimiyah, and Akkar sectors of the country.

The center piece of the plan was the Litani River project, based on a 1954 set of recommendations by the U.S. Bureau of Reclamation. USBR planners, taking into account Lebanon's plentiful rainfall, concluded that it made more economic sense to use the river's water to generate electrical power than to irrigate. Thus the plan envisaged a storage dam at the southern end of the Bekaa Valley near Qir'awn, and two hydroelectric systems, one of which required a substantial diversion of Litani water into the Awali River. By 1966 the major features of the Six Year Plan were in place. The Qir'awn dam with a storage capacity of 220 Mcm and the Awali power system began operation. Irrigation schemes and a power system for the lower sections of the river remained as future goals.

The dam and diversion of the Litani not only enlarged the



Awali's flow, but redistributed the waters of southern Lebanon significantly, a circumstance that was to become strategically important both as a domestic issue and as regards Israel's international hydropolitics.

In the same year that the first stage of the Six Year Plan was implemented, 1966, domestic competition among Lebanon's agricultural, industrial, and municipal sectors began to increase. Municipal use was stimulated by the rapid growth of the country's urban centers in the post war era. Urban life was controlled politically, and thus dominated economically and culturally as well, by Christians and sunni Muslims. This situation was created in part by the use of the Litani to generate hydroelectricity which made possible the rapid development of industry and business, but at the expense of agriculture in southern Lebanon. Thus, during the decade of the 1960s, the high living standards of Lebanon's urban population was tied directly to the policy decisions made for the use of the Litani River. The ensuing sectoral competition quickly melded with growing social and interconfessional tensions.<sup>5</sup>

Meanwhile, the Israelis continued tenaciously to argue for a share of the Litani or the right to purchase its water, insisting that the drop from the Litani into the Jordan would produce more and cheaper electricity than the drop from the Litani into the Awali. Lebanon and other Arab League members responded that

Israel consistently underestimated Lebanon's need of the Litani if its development plans were to be achieved. In 1964, The Arab League crystalized its plans for denying Israel water for its newly completed National Water Carrier and for counteracting Israel's out-of-basin transfers of Jordan River water into the Negev: The flow of the Hasbani would be rechanneled into the Litani or Yarmuk Rivers. This prospect brought immediate and real threats of military retaliation from Israel and opposition from the U.S. These factors plus prohibitive costs, put off implementation of the plan.

Throughout this period, Lebanon tried to navigate a course away from international conflict. The Lebanese government, concerned with internal religious factionalism which was increasingly complicated by the impact of external rival Arab nationalisms, did not want to be drawn directly into the vortex of the Arab Israeli struggle, but the Arab diversion plan appeared to make that prospect unavoidable. Moreover, selling Litani water to Israel, as Israel had long proposed and which was perfectly feasible, would have depleted the supply in a region of the country where Shiite farmers were already receiving inadequate amounts for irrigation and would have fomented even more resentment toward the Christian and sunni Muslim leadership in Beirut. In 1973 and 1974, which were drought-stricken years, rumors circulated in the south that more of the Litani River would be siphoned off to Beirut to ease water shortages there,

further depleting the supply in the south. These rumors, which aroused the apprehensions of the Shiite population, were a contributory factor to the creation the paramilitary Amal movement.

Arab nationalist politics and the Palestinian problem foreclosed any consideration of seeking a formal bilateral accomodation with Israel over water or any other issue. The Lebanese and other Arabs feared (with reason) that any concessions on water would be transformed into further Israeli territorial expansion. In face of these combined domestic and foreign hazards, and because of its own developmental needs, Lebanon simply could not agree to the transfer of Litani water into the Jordan. Since the time of these developments, published evidence has come to light in the form of the diaries of former prime ministers David Ben Gurion and Moshe Sharett which underscore Lebanon's apprehension of Israel's motives. Apparently, annexation of southern Lebanon and seizure of the Litani were frequent subjects of Israeli cabinet debate but political restraints forestalled action on the idea until 1982.<sup>6</sup>

In the end, the Six Day War resulted in making Israel the controlling, hegemonic upper riparian in the Jordan basin, and the upshot of this combination of events has been the militarization of water throughout the Jordan system since the early 1960s. Water has long been a central factor in the



strategic considerations of all the system's actors, and much of their hydropolitical planning has focused on the waters of southern Lebanon, a region characterized by a protracted, festering discontent among the local inhabitants.

The 1971 implantation of the PLO in southern Lebanon and the ensuing Israeli-Palestinian hostilities during the remainder of the decade, displaced the suffering peasant population of the south several times. Their migrations northward revealed, by comparison with other communities, the extent of their own underdevelopment. Their previous resentment turned to bitter anger directed against the government, the Israelis and the PLO, all of whom they perceived as exploiters. They formed their own Amal militia and made alliances of convenience with other armed groups, including the PLO. As conditions in southern Lebanon decomposed, and Shiite discontent fermented, water in the region became a more salient issue. Much needed hydro-development projects either ceased or staggered along, subsidies to agriculture stopped, and the irrigated cultivation of such cash crops as tobacco decreased by 60%. This situation reduced the income of many farmers to 10-15% of their 1960s level, fueling even more Shiite anger.

The chaos of southern Lebanon was disquieting to Israel and stimulated further Israeli incursions. With the invasion of 1978, Israel used its consolidated control over the Wazzani-

Hasbani springs to increase the flow of water into the Jordan and to lay pipelines to capture the runoff.<sup>7</sup> The larger invasion of 1982 gained for Israel control of the lower Litani and Qir'awn reservoir, and produced the current Israeli security zone. There is good evidence that fairly early in the current occupation, Israeli engineers took seismic soundings, surveyed, and even put in some equipment, all with a view to establishing the feasibility of diverting of some of the waters of southern Lebanon, chiefly the Awali and Litani Rivers.

However, that evidence, including the Kahane Commission Report on the Beirut massacres, does not support a conclusion that the primary motive of the 1982 invasion was seizure of Lebanon's southern waters, although the possibility of diversion of the Awali, Hasbani, or Litani was discussed in the Israeli cabinet and in its principal water planning agency, Tahal. In denying the charge concerning the hydrological objectives of the invasion, Israel offers several countervailing arguments: the political unpopularity and cost of its occupation; the fact that the lower Litani yields only about 100 Mcm/yr; the amount of water left in the Litani after Lebanese extractions would not justify diversion; and finally, the fact that in 1982 Israel's water supply was sufficient unto its needs and additional water from the Litani was unnecessary. Indeed, Israel's water supply was adequate in 1982, and even until 1985 when deficits began to mount more rapidly. However, supply and demand projections for

the next two decades indicated potential serious shortages, even before the unanticipated influx of Soviet Jewry. In this connection it must be pointed out that control of the upper Litani Valley would provide 500-600 Mcm more water, if the Qir'awn Dam and the Markabe diversion tunnel to the Awali were removed; but that would require taking all of the Bekaa Valley south of the Damascus road, a military venture that would be opposed by most of the Israeli public and international community, including the U.S.

Whatever Israel's basic aims were in 1982, its intentions with regard to the water of southern Lebanon continue to be viewed with deep suspicion by Lebanon and its riparian Arab neighbors, and it is these perceptions that influence the formulation of their policies. Arab mistrust of Israel's ambitions is reinforced by a number of factors: Israel's seizure of hydrological data when its troops entered Beirut; the fact that the Israeli army withdrew to the Awali River--into which most of the Litani has been transferred--rather than the Zahrani which would have reduced the area it had to defend; Israel's continued insistence that the Litani's average annual surplus or unutilized water is at least 300 Mcm despite Lebanese evidence to the contrary; the introduction of water restrictions on Lebanese farmers in the security zone similar to those imposed on Palestinians in the Occupied Territories, such as prohibiting the drilling of new wells and the capping of others; and



continued Israeli discussions of plans for the transfer of Litani water to the Jordan, not to mention public statements such as the one with which I opened this analysis.

Several questions surround the current situation in southern Lebanon: Does Israel intend to transfer significant amounts of water across the Green Line? Is Israel presently doing so? Will Israel link eventual withdrawal from the security zone to an allocation of Lebanese water, or will the need to control supplies of south Lebanon water determine Israel not to withdraw? Is there unused excess water in the amounts claimed by Israel? Will Lebanese recovery and development plans if fully implemented consume 80% or more of the southern region's waters as claimed?

Answers must proceed from the issue of Israel's present and projected water requirements. Israel normally has available from surface, ground, and marginal sources about 1950 Mcm of renewable water per year, excluding the Occupied territories. Owing to current drought conditions, Israel can count on only about 1600 Mcm/yr. Consumption in Israel for all purposes (including Jewish settlements in the Occupied Territories and Golan) is about 2100 Mcm/per year (per capita consumption is 280-300 litres/day-- 1/c/d). This produces an annual deficit of 150-200 Mcm/yr, or using Tahal's figures of 1820 Mcm/yr of present consumption and 1600 Mcm/yr of supply, a deficit of 220 Mcm/yr results. Current consumption rates are expected to rise to about 2500 Mcm/yr

sometime between 2015-2020 (some estimates are as high as 2800-2900 Mcm/yr). Israel is presently using about 108%-110% of its available stock and its accumulated deficit equals a full year's supply.

[Table 2 Isr. Supply and Demand]

Israel satisfies about 40% of its total national water budget from the Occupied Territories which under normal climatic conditions have a productive capacity of about 650 Mcm/yr, but the supply is now diminished to some 450-550 Mcm because of drought. Almost all of this water is produced by aquifers. It should be noted that Tahal's estimate for water production in the Territories is 200 Mcm/yr (110 in the West Bank and 90 in Gaza). The discrepancy lies in the fact that Israelis do not recognize as Territory water any sources that flow from the West Bank across the Green Line into Israel. Thus, the 200 Mcm Tahal figure represents only groundwater supplies that do not flow into Israel proper.<sup>8</sup> Although Israel has a right to and has long used water that originates in the West Bank and flows across its borders, 87% of the Territories water is now consumed by Israelis on both sides of the Green Line, and, under conditions of the occupation, no part of the water is controlled by Palestinians.

The meaning of these data is that about 70% of the groundwater on which Israel is dependent and more than one third of its sustainable annual water yield originate in the Occupied Territories. These facts have major implications for Lebanon,

because, in the circumstances, it is inconceivable that an Israeli government would ever relinquish the Occupied Territories without an effective plan, replete with a full array of guarantees and inducements, that would give Israel secure permanent access to sufficient quantities of the Territories' waters or guaranteed access to other comparable sources in the area: that means the Litani and Awali Rivers.

Israel's water needs have been potentially exacerbated by the massive influx of Soviet Jews who also consume water at the rate of 280-300 l/c/d. The necessary new supplies of water that Israel will need in the near future if it is to meet its developmental goals and provide an adequate livelihood for both the new immigrants and native born Israeli Jews and Arabs are not known to exist within Israel. A massive crash effort at desalination of sea water would not only be very costly (in addition to the \$38 billion Israelis estimate it will cost to settle a million new immigrants), but would still produce no more than a marginal supply, albeit an important one. In these circumstances, accessible sources of water outside Israel--such as the waters of southern Lebanon or the costly and vulnerable importation of water from Turkey--take on very serious economic, strategic, and legal implications.

We are now left with the questions of whether Israel has been taking water out of the Litani or other southern Lebanese



waters and what are Israel's future intentions.

The answer that emerges from the smoke of charges and denials that surrounds the first question is yes, Israel is taking water out of Lebanon, but, as available evidence indicates, not in any significant amounts, and mostly from feeder streams and springs, such as the Wazani and Hasbaya springs. There is greater uncertainty about the more politically sensitive issue of withdrawals from the Litani. Most reports concerning Israeli extractions from the Litani have turned out to be dubious, or inaccurate, or unprovable, or confused with withdrawals from proximate sources. However, in the spring of 1990, there were reliable eye witness reports of Israelis trucking water out of the Litani across the border into Israel. Again, if true, the amounts cannot have been significant and trucking is an inefficient and expensive means of moving large quantities of water, indicating that such an action reflected the seriousness of Israel's water shortage. Sporadic reports, some from fairly reliable witnesses, persist that trucking water from the Litani continues. Despite seismic soundings and surveys, the weight of evidence indicates that Israel has not yet laid pipelines or dug tunnels for the diversion of large amounts of Litani water; and even if there were such conveyances, the average flow of the lower Litani cannot exceed by much 100 Mcm, hardly worth the political dust-up the would ensue. Altogether, Israel is probably not taking more than about 100 Mcm/yr a year

from southern Lebanon.<sup>9</sup>

Although the quantity being taken by Israel may be relatively unimportant, the act of extraction by Israel cannot be dismissed as trivial. Whatever the actual amount, it is sovereign Lebanese water and as such is being taken in violation of Lebanon's rights under international law; as John Kolars and others have demonstrated, whatever happens to the Litani and other south Lebanon waters will impact on the hydrological interests of all the riparians in the Jordan system: Syria will be vitally interested in anything that it perceives as affecting the Orantes and Amman will be concerned with anything that threatens to reduce supply to the northern stem of the Jordan;<sup>10</sup> Lebanon's recovery will require the availability of all the water that the country's southern region has to offer; and the current extractions engenders this thought in the minds of Israel's neighbors: if Israel is allowed to take this water with impunity, what is to keep it from claiming and taking more? Thus, the issue is not so much hydrologic as it is intensely political, and it focuses on Israel's intentions.

There is no disputing Israel's interest in the Litani, just as there is no disputing that Israel is perceived as the most persistent threat to Lebanon's rights over the entire flow of the river. All of Israel's neighbors believe that if Israel's water shortage becomes critical enough, Israel would resort to

unilateral, arbitrary actions to divert the Litani without regard to international law or censure by the world community. There is no conclusive evidence to that effect, but Israeli behavior has not discouraged such perceptions.

Israel has three options for dealing with its water crisis, each of which would, if adopted affect what happens in southern Lebanon: 1) Israel could restructure its economy away from heavily consumptive irrigated agriculture to light industrial and service activities that would produce surplus capital with which to import food. (This year Israel has temporarily reduced irrigation by 30%) The yield from light industry to GNP is about 30 times greater per unit of water used than the yield from agriculture. Even so, such a move would be politically extremely difficult, run counter to Israel's security policy of food self-sufficiency, and be impossible without massive financial aid to cushion the hardships involved--the cost of settling the new immigrants thus complicates the restructuring option; 2) Israel could enter into a negotiated agreement with Lebanon for shared use of the Litani, but given the living history of mutual mistrust and animosity and the likely political fragility of Lebanon in the foreseeable future, this option is extremely unlikely; 3) Israel could use its long-standing claim that the Litani is part of the Jordan River watershed, to justify a forcible diversion, using whatever military action would be necessary. Militarization of water conflicts in the Jordan basin



has already occurred so this would not be a radical new departure from policy.<sup>11</sup>

Despite the fact that such a step is part of Israel's military contingency planning, there is no hard, non-circumstantial evidence that Israel is presently contemplating such an action. However, given that the negotiated agreement option is a virtual non-starter, if for any reason Israel does not pursue the first and most rational option, the only course left is the military one, even if that means little more than Israel using its dominant military power to maintain the status quo. That would be politically destabilizing to Lebanon and insure a continued Syrian presence.

We can thus conclude that Israel will continue to make a determined effort to share or control the waters of southern Lebanon, principally the Litani (or possibly the Awali) in one way or another. The validity of this statement is rooted in the history of Israel's claims and actions in this direction, in the projected supply and demand picture, and in the fact that there is no other body of water so proximate, with so much flow and such purity. Israel has made clear that it would react with extreme hostility should Lebanon or Syria adopt measures that would preempt future Israeli use of the waters of southern Lebanon.<sup>12</sup> Consequently, it is highly improbable that Israel would willingly agree to depart its security zone in Lebanon

without taking away in return as large an allocation of water as possible.

1. A private communication from Professor A.A. Kubursi, McMaster University, Ontario, Canada
2. T. Naff and R. Matson, Water in the Middle East: Conflict or Cooperation?, Boulder, 1984, 28-32, 65-71; F. Hof, Galilee Divided. The Israel-Lebanon Frontier, 1816-1984, 14ff; H.F. Frischwasser-Ra'anana, The Frontiers of a Nation, London, 1955, 70-72, 85-88, 91-106, 138-41; I.K. Khalifeh, Lebanon's Southern Border, Beirut, 1885, 65-67; Doreen Ingrams, Palestine Papers 1917-1922. Seeds of Conflict, London, 1972, 18ff; Sana Bardawil, Israeli Claims on Lebanese Water: The Litani River, unpublished M.A. thesis, St. Antony's College, Oxford, May 1991, 10-30 (Bardawil has mis-cited Frischwasser-Ra'anana, 13, note 12).
3. Naff and Matson, Water in the Middle East, 63-65; John Kolars, The Litani River in the Context of Middle Eastern Water Resources, unpublished paper, courtesy of the author, 3-5; Stephen Lonergan, Climate Warming, Water Resources, and Geopolitical Conflict: A Study of Nations Dependent on the Nile, Litani and Jordan River Systems, Operational and Research and Analysis Establishment, Ottawa, Mar. 1991, 17-18.
4. These and other plans are detailed in Naff and Matson Water in the Middle East, 28ff; S.N. Saliba, The Jordan River Dispute, The Hague, 1968, 99-112; Miriam Lowi, The Politics of Water Under Conditions of Scarcity and Conflict, unpublished Ph.D. dissertation, Princeton University, Oct. 1990, chs. 3-5; S. Bardawil, Israeli Claims on Lebanese Waters, 31-58.
5. Naff and Matson, Water in the Middle East, 72-73.5.
6. Naff and Matson, Ibid., 70-71.
7. Naff and Matson, Water in the Middle East, 70-75.
8. My data on Israel's and the Occupied Territories' water supplies are drawn from the following sources: communications from Jehoshua Schwarz of Tahal in June and July 1991; data supplied by the Water Research and Study Center (WRSC) of Jordan University; The U.S. Army Corps of Engineers, Water in the Sand. A Survey of Middle Eastern Water Issues, Washington, D.C., June 1991, 1-13; Meron Benvenisti and Shlomo Khayat, The West Bank and Gaza Atlas, Jerusalem, Jerusalem, 1988; Hisham Zarour and Jad Isaac, "The Water Crisis in the Occupied Territories," unpublished paper presented to the VII World Congress on Water, Rabat, Morocco, May 12-16, 1991; and the AMER database.

9. Kolars, "The Litani River," 31.
10. Kolars, Ibid., 31-32; Lonergan, Climate Warming, 51.
11. T. Naff, "The Jordan Basin: Political, Economic, and Institutional Issues," International Workshop on Water Resources Management, The World Bank, Washington, D.C., June 24-28, 1991; Lonergan, Climate Warming, 80; Naff and Matson, Water in the Middle East, 79-80.
12. Naff and Matson, Water in the Middle East, 79.