POLICY PAPER 42: ENVIRONMENTAL DIPLOMACY IN THE JORDAN BASIN

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ABSTRACT

This paper reviews the achievements of Middle East environmental diplomacy under the multilateral track and lays out a feasible program to build on these achievements. It argues that negotiations should be informed by three lessons from the history of international water diplomacy. These are:

1) unequal partners may unequally share the costs and benefits of cooperation;
2) third-party mediation is most successful if accompanied by "carrot and stick" policies; and
3) cooperation should proceed as a series of modest steps, rather than as a grand regional plan.

The paper analyzes three issues in urgent need of multicountry cooperation. These are:

1) food for water trades to enhance food and water security in the region;
2) a transition to integrated pest management to halt the pollution of groundwater from agricultural runoff; and
3) the treatment and reuse of urban wastewater for health and water conservation. In addition, the countries of the region should, jointly and individually, invest in environmental training and outreach. The conclusion contains an itemized list of short-to-intermediate term recommendations for environmental diplomacy.

INTRODUCTION: WATER AND ENVIRONMENT IN THE MIDDLE EAST

When the freshwater available in a country drops below 1,700 cubic meters per person per year, it can no longer meet its health, hygiene, and food self-sufficiency needs from its domestic sources (Postel 1992). Many countries of the arid Middle East—Bahrain, Oman, Egypt, Jordan, Israel, and the Palestinian territories—fall short of this threshold. Yet living standards in this region are rising steadily and populations are rising fast. Unsurprisingly, all the region's rivers and aquifers, the Litani excepted, are in constant and fierce dispute. Most contentious of all is the short and muddy Jordan River on which 14 million Jordanians, Israelis, and Palestinians depend. By 2015 the Jordan will support almost 20 million people (World Bank 2000).

Increasing the freshwater supply through

desalination is possible, but the costs are high and the plumbing requirements are complex. Containing demand is also possible, but it is painful in a region where water is seen as a historical and cultural birthright. And reallocating water across national borders is always unpleasant, especially when the neighbors are none too friendly.

Looking beyond water, the Middle East has its share of the environmental hazards that are the dark side of growth and development. Seawater intrudes into overmined aquifers, making the water too salty for the citrus groves of Israel and Gaza.[1] Oil spills from tankers plying the Mediterranean Sea. Open sewage in the West Bank smells terrible and spreads vector-borne diseases to children.[2] Pesticide and fertilizer residues pollute the soil and groundwater, and have been found in Nile-water fish sold in Israeli markets.[3] Uncontrolled tourism on both sides of the Red Sea endangers fragile coral reefs with their rich store of endemic species (Bryant 1998).

Every one of these environmental problems, some of which are essentially water use and disposal problems, cuts across national boundaries. There is no choice, therefore, but to search for transboundary solutions. It is true that territorial hostilities and the build-up of past grievances make cooperation enormously difficult. It is also true that environmental problems cannot be tackled if violent conflict continues. Nevertheless, the countries of the core region (Israel, Jordan, Egypt, and the Palestinian Authority[4]) have acknowledged the need for environmental cooperation. They have engaged in water and environmental diplomacy, albeit in fits and starts. One avenue for such negotiations is the "multilateral track"—semi-official groups of regional and nonregional experts who try to resolve economic, environmental, and water-related problems in the Middle East.

THE MULTILATERAL TRACK: LOOKING BACK AND LOOKING AHEAD

Under the leadership of the United States and the former Soviet Union, five multilateral working groups were convened in 1992 as an adjunct to the Arab-Israeli bilateral negotiations (Peters 1996). These included one each on water and the environment, chaired by the United States and Japan respectively. The official peace talks focused on land shares and water rights, and naturally were extremely contentious. In the background, the multilateral groups fostered cooperation among technical and scientific experts, who often had more in common with one another than with their own political leaders. They promoted the environmentally sustainable use of the region's natural resources. Ideally, progress in the two diplomatic tracks would create a positive feedback loop influencing both tracks.

In the last decade, the water and environment groups met several times. The delegates held workshops, supported fact-finding missions, vented their anger, and conducted research, training, and institution-building sessions. Funds were raised for a desalination research center in Muscat which is now up and running. An important, though nonbinding, environmental code of

[1]Aquifer Desalination Alarms Must Be Taken with More than a Grain of Salt, *Ha'aretz*, 15 February 1999.

[2]Sewage Endangers Jericho's Water Supply, *Ha'aretz*, 21 February 2000.

[3]Nile Fish: High Level of Toxicity and Pesticide Residue, *Ha'aretz*, 15 April 1999.

[4]Syria is also a core country of the Jordan- Yarmuk. It has not yet agreed to joint talks with Israel.

conduct was ratified unanimously in Bahrain in 1994. A joint program for responding to oil spills in the Gulf of Aqaba/Eilat is in place, and was successfully tested in 1995 (Warburg 1995). Despite these achievements, the multilateral track has been criticized as slow and ineffective because many of its ambitious ideas have not progressed beyond on-paper recommendations (Reubner 1999).

The multilateral groups reach decisions by consensus rather than by majority vote. Project implementation has been slow, partly because of funding limitations and partly because everyone has to agree to every concrete action. This is quite difficult when the negotiating parties do not trust one another and do not share the same priorities. In addition, progress in this track has been weighed down by periodic breakdowns in the official peace talks. These are the circumstances in which the international community must take the next steps in environmental diplomacy.

We believe that future talks should be based on three guiding principles. First, the issues chosen for action and/or research should be ones in which the parties have *overlapping interests* and similar priorities. For the short run, doable projects might include setting up food-for-water trades, or educating farmers about the storage and disposal of agricultural chemicals. For the longer haul, the international community could facilitate research and outreach in areas where interests overlap but immediate change may not be feasible. Examples include wastewater treatment and reuse, or a region-wide integrated pest management program. These project proposals are distinctly unglamorous, but they are urgent. Given some financial and technical support from the international community, they are likely to be feasible.

Second, the issues chosen should *generate some side-benefit* that itself contributes to peace and well-being in the region—perhaps building up human capital through teaching technical skills, perhaps improving regional planning through collecting and sharing data (Hanemann 2000). To treat pesticide residues in Gaza, for example, the United States and the EU could provide the start-up costs of treatment, while Israeli and Palestinian water experts teach residents how to monitor the affected aquifer. Such a joint monitoring committee could establish a precedent for future collaborations

Third, the *lessons learned from other water-related disputes*—and their resolutions—should inform the process of environmental diplomacy in the Middle East. Deep dissension and distrust among neighbors is not unique to this region. There are countries, some of which have waged cold (or even warm) war with one another, that nevertheless have functioning water-sharing agreements. Examples include the Mekong River Committee, and, remarkably, the Indus Valley Agreement between India and Pakistan. Most of these agreements had to overcome differences in preferences and in perceptions among the negotiating parties, as well as set up verifiable implementation procedures (Kliot et al. 1997). In the next part of this paper, we analyze the successes (and shortcomings) of existing international agreements and highlight three principles that seem most relevant for the Middle East negotiations.

WATER CONFLICTS AND THEIR RESOLUTION: THREE LESSONS FOR THE JORDAN BASIN

There are 261 rivers that can be classified as "transboundary," meaning that they cross international borders. Water can be, and has been a source of conflict when states fight over its control, target it during times of war, use it to further political goals, or have different development priorities for the shared water source (Gleick 2000). However, it has also been an instrument of cooperation among nations, as shown by the many surface and groundwater treaties in existence today (Wolf 1997). These treaties range from ambitious development plans and basin-wide water management (for example, the Israel-Jordan Peace Treaty), to more modest proposals limited to gathering data and guaranteeing downstream flows (for example, the Tigris-Euphrates Accord). Lessons from the history of international water diplomacy could usefully be applied to environmental diplomacy in the Middle East.

It could be argued that cooperation over the shared environment is not analogous to that over shared water. Water agreements are above all *distributive*, so the negotiating parties usually perceive water allocation to be a zero-sum game. Environmental solutions, such as those over water contamination or coastal protection, are frequently *integrative*. Therefore a mutually beneficial, or positive-sum game is feasible. However, several lessons from water conflict resolutions carry over to the broader environment.

First, it cannot be assumed that, once the "optimal" or positive-sum solution is identified, conflicts will be resolved because the solution is win-win (Zartman 1992). Negotiations can deadlock over how the joint benefits (and their accompanying costs) are to be allocated. Environmental cooperation is partly integrative but partly distributive.

Second, many of the Middle East's environmental problems, such as aquifer contamination, unsanitary disposal of waste, and so on, are problems of water quality. Water quantity and water quality are inextricably linked, simply because as clean water becomes dirty, it becomes unusable for drinking, bathing, or growing food. Some, though not most, water agreements have provisions for water quality protection, especially when upper-riparian pollution is a problem.[5]

Third, international water diplomacy has raised pertinent questions about the role of third-party mediation, and of unilateral versus multilateral action. For example, are international organizations successful when they try a "carrot and stick" approach to bring the parties to the bargaining table (Nakayama 1997)? Similarly, can a country make unilateral changes in its water use practices rather than negotiate joint management steps with all its neighbors (Middle East Commission 1995)? These questions are relevant for environmental diplomacy, especially in the Middle East where the international community has a strategic interest in fostering cooperation.

Transboundary Water Agreements

Of the more than 140 transboundary river treaties in existence, we have chosen three as being most relevant to the Jordan-Yarmuk basin. These are the settlement of the Indus dispute between India and Pakistan, ratified in 1960 and not broken in spite of two wars and several border clashes; the Colorado/Rio Grande Treaty between Mexico and the

[5]Examples include the treaties governing joint management on the Danube and the 1994 Peace Treaty between Jordan and Israel (Scheumann and Schiffler 1998).

United States, concluded in 1944 and implemented by the IBWC/CILA;[6] and the Murray-Darling Agreement of 1915 between Victoria, New South Wales and South Australia. The Murray-Darling is not an international river, but Australian states enjoy great autonomy in economic and resource management matters.

Between India and Pakistan, as between Israel and the Palestinians, bitter border disputes were, and are, ongoing. Wars have broken out over who owns what land, and the degree of distrust between the neighbors is comparable in both cases. Border disputes exist, but are less controversial, between the United States and Mexico. Though the United States and India are larger and more powerful compared to Mexico and Pakistan respectively, hegemonic "solutions" were not imposed on the Indus or on the Colorado/Rio Grande basins. The United States and India have their counterpart in Israel's economic and military power relative to Jordan and the Palestinian territories. Likewise, the River Murray Commission ensured that no state gave up much authority either to another state or to the Commission (Kliot and Shmueli 1997). And finally, the agreements signed on all three basins involved all the riparian parties—unlike, for example, the Mekong Committee, which excluded China.[7] These three treaties, therefore, seem most appropriate to the Jordan-Yarmuk case.

Many factors contributed to the conclusion, and subsequent implementation of, the Indus, Murray-Darling, and Colorado/Rio Grande treaties. All these treaties are at least qualified successes, and have been in place for several decades. We highlight three of these factors as key principles, because they have clear policy implications[8] for Middle East environmental diplomacy. These principles are 1) the unequal division of costs and benefits among unequal partners, 2) the role of nonbinding third-party intervention, and 3) the phased implementation of joint management and the need for some unilateral actions. Negotiation is a dynamic process, and these "key principles" are as much about the process of cooperation as they are about its outcome.

Unequal sharing of costs and benefits.

On the Indus as well as on the Rio Grande, the negotiating partners were unequal in their economic and military power. In fact the stronger countries—India and the United States respectively—were also upstream. Yet the Indus Treaty partitioned the river such that 79 percent of the total flow was allocated to Pakistan (Mehta 1986). Furthermore, India agreed to pay $174 million for infrastructure investments needed inside Pakistan (World Bank 1960), while Pakistan agreed to pay India for meteorological data gathered inside India. This arrangement exploited the ability of India to pay certain costs and the willingness of Pakistan to pay for certain benefits.

Similarly, the agreement on the Colorado tried to redress the wealth

[6] International Boundary and Water Commission/*La Comicion Internacional de Limites y Aguas*. At Mexico's insistence, the Colorado and Rio Grande rivers were covered by the same treaty.

[7] They have also generally been implemented—unlike several provisions of the Senegal basin joint management framework.

[8] Some factors that help (or hinder) negotiations have no obvious policy implications. For instance, on the Indus basin, the leaders of Pakistan trusted Prime Minister Nehru of India. We focus on replicable negotiation strategies, though of course leaders who command respect across national borders could be critical.

asymmetry between the United States and Mexico. Though water salinity disproportionately hurt Mexico, it was in the U.S. interest to enforce its own water quality standards. Mexico argued, and the IBWC/CILA eventually agreed, that the United States wanted and could afford better-quality water than Mexico was prepared to pay for. Consequently, the costs of desalination and water treatment plants (at Tijuana and Nogales) were largely borne by the United States (Wolf 1997).

Israel, with a 1998 per capita income of U.S. $16,000 as against a Middle East and North Africa average of $2,000 (World Bank 2000), is financially more secure than its neighbors. It also has higher internal water-quality standards than either Jordan or the West Bank/Gaza. In future negotiations, Israel may have to consider shouldering the "burden of generosity," that is, it may have to take more responsibility for curbing groundwater pollution and share its expertise with the Jordanians and Palestinians. Though Israel—or any country in its position—would prefer to divide the costs of mutually beneficial projects equally, the histories of the Indus and of the Colorado suggest otherwise.

Third party intervention.

It is only possible for third parties to intervene or mediate when the primary parties to a dispute are themselves ready to cooperate. A third party, however well-meaning and however well-financed, cannot set the stage for cooperation. That being said, the Indus Agreement is widely regarded as one of the most successful cases of mediation—by the World Bank—between hostile neighbors.

The Indus treaty, originally proposed in 1952, was finally concluded in 1960. The World Bank actively mediated between the leaders of India and Pakistan, and politely threatened to pull project-related (and other development) funding if no agreement could be reached (Le Marquand 1981). The Bank's role as a neutral party which could offer financial incentives was critical to the treaty. This success story can be contrasted with the Bank's failure to cajole India and Bangladesh into a similar agreement on the Ganges. By that time, the mid-1970s, India was sure that its development loans were no longer in jeopardy. The Bank's "carrot and stick" policy had become ineffective (Kirmani and Rangeley 1994).

On the Jordan-Yarmuk basin, unassisted tripartite negotiations among Israel, Jordan, and the Palestinians are, of course, the first step. Where assistance is called for, the multilateral and other international groups should offer nonbinding mediation, possibly with binding arbitration as the last resort (Haddad and Feitelson 1998).[9] But the experience of the Indus and Ganges shows that funding for projects, *which otherwise would not be forthcoming*, may be necessary. Diplomatic efforts or research assistance may not be enough.

Phased implementation/partition of responsibility.

The River Murray Commission is a good example of the twin principles of phased implementation and partition of responsibilities. The Commission started in 1915 with limited powers (assigning water

[9]Nonbinding mediation backed by binding arbitration is generally considered a "strategy" developed by experts in alternative dispute resolution methods. However, Wolf points out that this is an age-old practice in traditional communities such as the Berbers of the High Atlas (Wolf 2000).

flows to competing states) that were slowly expanded over time. By 1988, it was engaged in measures to improve salinity, waterlogging, loss of vegetation, and integrated watershed management (Gilpin 2000). A series of agreements over several decades both adjudicated claims and became confidence-building measures in themselves. The administrative machinery has remained flexible—it collects information and makes recommendations, but the task of implementation is largely left to individual states. The states cede to joint decision-making in specific cases, but have freedom of action otherwise (Kliot et al. 1997).

Similarly, in the Rio Grande agreement of 1944, salinity and water quality were not originally covered. The treaty dealt with domestic water use, agriculture, hydropower, fishing, and navigation. But by the time Mexico complained about salinity, the IBWC/CILA had earned enough credibility to intervene in this matter.

The implication here is that where broad mandates and basin-wide cooperation appear too difficult, cooperation could nonetheless proceed in a series of small steps. This method may actually retain greater flexibility in the face of future changes. At the same time, some steps could be taken within each country, without the need for constant negotiation, but with benefits to its population and environment. These individual steps would enhance the prospects for future multi-state cooperation (Waterbury 1997), and so deserve international assistance.

In the next three sections, we illustrate these points for three specific water and environmental concerns with transboundary implications. These are water-for-food exchanges between Israel and the Palestinian territories, a transition to integrated pest management, and the treatment of wastewater for possible reuse in agriculture. We focus on the agricultural sector because agriculture is the biggest user, and a significant polluter, of freshwater in the Middle East. In each case, we indicate the nature of the problems and suggest traditional and innovative ways in which they can be addressed. Wherever relevant, we point to the institutional and implementation components of our proposals, which remain neglected relative to the technological components.[10] Finally, we discuss the need for training, capacity building, and outreach in the environmental area across national and disciplinary boundaries. The lack of trained personnel is a major institutional barrier to implementing the best of proposals.

VIRTUAL WATER EQUALS REAL FOOD: A FOOD-FOR-WATER COMPROMISE

The physical control of the West Bank is seen as critical in Israel because of the aquifers underlying it. At the same time, the Palestinians claim the aquifer water rights and argue that they should use the supply as they see fit. Although the approximately 650 million cu m pumped annually from under the West Bank could meet all Palestinian water needs well into the future, today they receive less than one-third of that supply. As water flows underground from west to east, the remaining two-thirds are pumped into Israel, a result of Israel's "first-use" claim pre-1967. This supply from the West Bank, which is the best quality water available in the region, provides one-quarter of Israel's

[10] As Dalia Dassa Kaye has argued, anything, even a technology, can be made political (Kaye 1998).

freshwater needs.

It has been argued that, rather than a water crisis, the Middle East faces a sector misallocation crisis. Too much water goes into agriculture, thus implicitly favoring food security over water security. Food security concerns operate on both sides of the Green Line. Israelis feel that they are surrounded by hostile nations and must have their own arms, raw materials, and food. In addition, the attachment to agriculture as the core of the Jewish state is a legacy of the early Zionist settlers (Lindholm 1995). On the other hand, Palestinians are worried that Israel may close the borders and "starve" them of jobs and food at any time. In addition, land and water rights are such that, unless land is cultivated and water is used, the rights can be withdrawn (Berck and Lipow 1995).

As a result of these sentiments 79 percent of the water withdrawn in Israel and 63 percent in the Palestinian territories goes to agriculture (Haddad 2000). Agriculture is significant in the Palestinian economy, contributing 23 percent to the gross domestic product and employing 25 percent of the labor force (World Bank 2000). By contrast, under 3 percent of Israel's labor force is in agriculture.[11] Labor-intensive agriculture for the Israeli domestic market is becoming less and less economical because of the rising costs of land and labor. A significant part of Israel's citrus crop is already harvested using cheaper Palestinian workers.

In addition, the water demands of crops and livestock are such that most of the Near Eastern countries cannot actually be food self-sufficient.[12] Israel today imports over 2 million tons of cereal and 16 million tons of pulses (Haddad 2000).[13] It also purchases the entire Palestinian agricultural surplus, at present about 8 percent of Israel's fresh fruit and vegetable needs. It can be argued that Israeli food security is already tied up with the viability of Palestinian agriculture.

A suitable food-for-water compromise would allow Israel to continue to buy the entire Palestinian fresh fruit and vegetable surplus, in exchange for a larger water supply for Palestine in order to expand that surplus. Over the next 10 to 15 years Israel and Palestine could agree to increase the share of West Bank water available to Palestinian agriculture. The Palestinian territories could produce a larger share of the fresh food needs of Israel at much lower labor costs. Israel could increase its produce imports relatively cheaply, particularly of labor-intensive field crops. Those imports would amount to a re-interpretation of "virtual water," with benefits guaranteed to both parties.

Israel would gain a guaranteed source of fresh, low-cost food. It would gain from increased Palestinian purchases of high-profit Israeli seeds and irrigation technologies. It is also likely that Israeli expenditures on Palestinian products would be re-spent in large part by Palestinians in Israel. For the Palestinians, this arrangement

[11]Current data on agriculture's share of the GDP in Israel is not available. In 1977 it was a mere 5.9 percent. Since then, the relative share of agricultural labor has fallen, but the area under cultivation has risen (World Bank 2000). The net effect of these changes is at present unknown.

[12]For example, 1 metric ton of cereal in this region requires 150 cu m of water, 1 ton of citrus—the main agricultural export of Palestine—needs 100 cu m. Milk cows, important in Israel, need 400 cu m per head (FAO 1997). These figures are averages, of course—they vary according to microclimate and irrigation methods.

[13]Jordan is also a net importer, buying 1.5 million tons of cereal and 24 million tons of pulses. Comparable figures for the West Bank and Gaza are not available.

would yield a steady increase in agricultural jobs at a time of high unemployment. It would guarantee an expanded market for their fresh fruit and vegetables. More land could be cultivated and irrigated, and more income earned inside the West Bank and Gaza.

There are three potential institutional/political obstacles to this proposal. First, if more water is to be diverted to the West Bank, there must be an agreement to monitor jointly water use and pumping on each side. This might be achieved through monitoring water levels in designated "benchmark" wells, for example, as well as withdrawals at specific turnout points. Second, the Palestinians must agree to sell their surplus into a monopsonistic market. However, given that the produce prices in Israel are generally higher than international prices (Berck and Lipow 1995)—a policy intended to protect Israeli farmers—the Palestinians might not object too much. Finally, if produce prices fall in Israel as a result of increased imports from the West Bank, Israeli farmers could need a combination of convincing and compensation to accept the deal. Some of them may even drop out of farming altogether. These potential problems have to be negotiated, preferably with the intervention of neutral third parties such as the multilateral groups.

In this proposal, Israel as the financially stronger party (and the *de facto* owner of the reallocated water) is made to shoulder the greater (initial) cost of cooperation. Israeli "generosity" in water transfers can be presented to the international community as a price that Israel is willing to pay for peace. It could then be "rewarded" with diplomatic goodwill, and, more concretely, through the establishment of an international fund for research in water desalination, integrated pest management, or the cleanup of chemically contaminated sites. The fund could be used to create high-tech jobs and scientific cooperation between Middle Eastern and other water scientists. Developments and patents produced through the research and development fund could sustain ongoing cooperative research projects. Palestine would gain an increase in water share, job creation, markets, and participation in an international research and development fund. Israel would gain by replacing real water with virtual water while keeping money in the local economy, and increasing sales in agricultural inputs as well as financing for essential projects.

The real versus virtual water compromise points to the need for the *stronger partner to bear the higher cost* of cooperation, as well as the need for *third-party mediation and financing*. But it is important to note that, because of the high rate of population growth in the Jordan Basin and the limited water supply of the West Bank, any such agreement can only be a short-term solution. At current *per capita* rates of extraction (Gleick 1998), after a period of 15 years there may be no freshwater in Israel or Palestine for other than domestic purposes. Over the longer term, solutions such as desalination, wastewater reclamation for agriculture, and rational water pricing must be integrated with the one proposed here (Water in the Middle East 1995; Squeezing Water from the Sea 1998; Zilberman and Carson 1999). In the interim, buying time with virtual water will itself be a bridge to a regional high-tech hydro-economy and an important step towards mutual rather than individual food security.

CONTROLLING PESTS AND PESTICIDES: THE ROLE OF INTEGRATED PEST MANAGEMENT

There can be no workable water security agreement in the Middle East without the effective management of water quality. Modern agriculture is one of the greatest contributors to water (and, ironically, food) quality problems. Farm runoff containing salts and pesticides is the principal source of contamination in the region's rivers and lakes.[14] Groundwater is especially vulnerable in Jordan and the West Bank, where the dolomite and limestone aquifers are soft and permeable (Water in the Middle East 1995). These aquifers urgently require cooperative management. The West Bank and Israel share the Northern and Mountain aquifers, Jordan and Saudi Arabia share the Disi/Saq, yet only one of the region's water agreements, that between Israel and Jordan in 1994, even mentions water quality.

While high-level pesticide use is damaging in any environment, the problem is particularly severe in the water-scarce Middle East. Unfortunately, there is no shortage of pesticides there; in Israel alone $80 million is spent on pesticides per annum. Comparable figures for Palestine are not available, but there is evidence that usage is high, including of pesticides that are certifiably detrimental to human health (World Bank 1993). The health impacts of exposure to organophosphates and carbamates range from chronic nausea to neurobehavioral abnormalities (World Resources Institute 1986), as multilateral-supported workshops in Amman and Cairo have made clear.

Synthetic chemicals not only contaminate the freshwater, they also lower the safety and the market value of produce. Israel and the European Union have ceilings on pesticide residues in imported fruit and vegetables, which produce from the Palestinian territories does not consistently meet. Limited programs have successfully reduced pest levels and pesticide use, but until a region-wide cooperative pest management system is adopted they cannot be totally effective.

In order to protect the current water supply and future food and water quality, we recommend four important policies. Each must be *phased in* as a series of short- and long-term steps, some of which can be *implemented unilaterally* rather than cooperatively. Each must be facilitated by *extra-regional funding* and *coordination*.

First, reducing the risks of pest management is not just a matter of reducing chemical use, as ineffective pest management could lead to insect-borne diseases. The reduction of pesticide use is best achieved through a system-wide reshaping of the current pest control practices on all major crops, referred to as integrated pest management (IPM). Environmentally rational and financially viable pest-control techniques must be developed and adopted; the successes and failures of local IPM efforts must be widely and cheaply disseminated.

Second, farmers and field workers must be educated about safe and timely application and proper storage of chemicals currently in use. Much of the damage from pesticide use is caused by excessive and untimely spraying. This step is especially urgent in Jordan and Palestine where farmers lack information regarding safe use

[14] Aquifer Desalination Alarms Must Be Taken with More than a Grain of Salt, *Ha'aretz*, 15 February 1999.

and cannot afford protective equipment (Cohen-Vogel 2000). Third, the storage and eventual disposal of now-obsolete pesticides should be arranged. The FAO has found that the Middle East and Africa have dangerous levels of contamination from obsolete chemicals, often stored in leaking containers near water sources.[15]

Finally, in the longer run, the countries of the region may need to re-examine their pricing and industrial policies. Agricultural chemicals are subsidized and supported in the Middle East—Israel is an important exporter of agricultural chemicals, and cotton farmers in Egypt receive subsidies of up to 86 percent for pesticides and insecticides. There may well be internal dissent in countries that adopt a less chemical-friendly attitude.

Integrated Pest Management

Integrated pest management (IPM) is the use of pest control techniques to encourage healthy crop growth with the least disruption of the natural ecosystem. It does not require the farmer to abandon chemicals altogether. Rather, IPM is a continuum from scouting for pests supplemented by low levels of spraying to bio-intensive cultivation with no reliance on pesticides or inorganic substances.

For IPM to be successful it must meet three conditions. First, it must be ecologically sustainable and focus on processes that are non-contaminating and self-renewing. Second, it must be economically sustainable and enhance crop profitability and product quality. And third, it must be socially sustainable through a genuine partnership between farming communities and their local governments. These three requirements are closely related. The Israeli extension agency (SHAHAM) reports that only when farmers are convinced 1) that pests are becoming resistant to traditional chemicals, and 2) that IPM crops are competitive on the international market, do they actively and collectively adopt nonchemical practices.[16]

IPM requires sustained work with contiguous groups of farmers. The FAO reports that many farmers' groups, mostly rice growers but increasingly cotton and legume producers, have enthusiastically adopted IPM practices.[17] Farmers are trained in "field schools" that cater to the crops, major pests, and possible secondary pest infestations that are specific to particular microclimates (APRC 1994). Field schools have included Egyptian cotton farmers—in general heavy pesticide users—who were taught to identify pests; avoid peak infestation through their choice of planting dates; hand pick weevil eggs; monitor breeding patterns to optimize spraying patterns; and burn infested bolls.

In Israel as well as in Palestine, there is evidence of locally effective IPM efforts. In Israel, the Ministry of Agriculture (particularly SHAHAM) has worked for a decade to promote environmentally sustainable pest controls. Supervised IPM and biological control systems are used on about 70,000 out of 200,000 hectares of irrigated land. Crops under IPM include deciduous fruit trees, citrus, and cotton. In the targeted zone, average pesticide use has fallen by between 30 percent and 40

[15]Food and Agriculture Organization of the UN, Integrated Pest Management. Available at <www.fao.org/WAICENT/FAOINFO/AGRICULT/agp/agpp/IPM>.

[16]Reuben Ausher, n.d. Extension Propelled Integrated Pest Management. Available at Agricultural Knowledge and Information Systems page of the World Bank Group website: www.worldbank.org/essd/susint.nsf.

[17]See fn. 10.

percent.[18] In Palestine, the use of biological controls began in the mid-1970s with several kinds of biological agents for citrus, vegetables, and grapes. Crop rotation is in wide use for field crops, especially in the north against soil-borne pathogens.

Tried and tested nonchemical practices in the region include:

- Physical methods for monitoring and controlling insects and pests, such as sticky tapes, especially in the West Bank and Gaza;
- Exclusion nets around greenhouse vegetables to halt insect-borne viruses in Israel and the West Bank;
- Soil solarization for controlling soil-borne plant pathogens in Jordan and in Gaza;
- Simple plant hygiene procedures such as pruning and burning olive tree branches infected with olive bark beetles;
- Inter-cropping to reduce the population of white flies in the Jordan Valley; and
- Introducing sterile male flies in the Arava Valley, a joint Israeli-Jordanian-American IPM venture which drastically reduced the Mediterranean fruit fly population.

There have clearly been good experiences with IPM in this region, but to date there has been little actual cooperation across borders. Instead, each country has implemented an often effective, but localized system. In order for IPM strategies to supplant chemical-reliant strategies, especially in a small region like Israel-Palestine-Jordan, there must be full cooperation and collaboration. This can be carried out with, for example, financial assistance harnessed by the multilateral working groups, and the extension assistance of Israel's SHAHAM. Integrated pest management programs have to be separately developed for different agro-climatic regions and crops, which makes IPM an excellent area for applied research. Unilateral steps taken by individual countries also need multilateral support, especially in the critical area of government and/or NGO-led extension.[19]

IPM is a very labor-intensive procedure and requires constant supervision. Unlike chemical pesticides, IPM does not work predictably and under all circumstances. Farmers can confront secondary pest infestations if they reduce their use of broadly effective chemicals in favor of targeted, less toxic options. For these reasons, growers often resist IPM. There is also more information in the public domain on the costs of avoiding synthetic pesticides than on the potential benefits of doing so, and inadequate research on the comparative risks of chemical versus nonchemical agriculture (Benbrook 1996).

In fact, the spread of IPM will likely generate more rural employment, which is important in the Palestinian territories and parts of Jordan. It will certainly cause fewer health-related problems for consumers and for farm laborers. It will protect the region's drinking water supply from further pollution. It will also give the Middle East a competitive edge in the rapidly growing

[18] Precise figures for the net returns of IPM per unit of water are not available. Israeli agriculture policy subsidizes water, has different levels of support pricing for different crops, and protects its domestic chemical industry. Therefore the actual economic effect of reduced pesticide use is difficult to calculate.

[19] Poorly planned or unrealistic extension activities can destroy the best IPM, or other, proposals. In 1994, Jordan's Ministry of Agriculture proposed a major extension effort to increase farm productivity and income. The lack of funding and the failure to involve farmers in every step of the process made the ambitious proposal largely ineffective (K. Sabaihi, n.d., available at <www.worldbank.org/essd/susint.nsf>).

"niche" market for high-value, residue-free produce (Ausher n.d.). But none of the regional countries can fulfill its potential alone. There is a pressing need to overcome political obstacles—both within and without national borders—to allow for real on-the-ground cooperation that will benefit the region as a whole.

WASTEWATER: A LIABILITY OR A RESOURCE?

Of all the environmental problems that plague the cities of the Middle East, none is as critical as wastewater disposal. In the West Bank and Gaza, only 50 percent of the wastewater is collected and partially treated. The rest ends up in percolation pits and open channels. Dysentery, diarrhea, and malarial outbreaks recur in such conditions. In addition, settlements have risen up in the Palestinian territories even when there was no adequate sewage removal infrastructure. The Israeli Nature Reserves and Parks Authority has found that settlements near Jericho, for example, release sewage which contaminates local springs, which then feed into the region's *wadi*s.[20]

Wastewater Treatment

The safe treatment or disposal of contaminated water—whether contaminated by human waste or chemical waste—has two related strands. The first concerns infrastructure, the second maintenance. International agencies have successfully worked at both levels, as the Middle East parties certainly can. Western-style disposal with daily cover and leachate control is expensive in the developing country context. The World Bank has experimented, in many cases with success, in simpler treatment facilities.[21] These include stabilization ponds (where land is available) and communal septic tanks with anaerobic filters. Where collection facilities have to be built from scratch, as they do in parts of Egypt, Jordan, and Gaza, the additional effort needed to incorporate wastewater treatment for later reuse makes a lot of sense.

Technical possibilities apart, feasible diplomacy must address two related questions: Who will pay for treatment? And who maintains the systems, once built? Even for relatively simple treatments, some *public or international financing* seems necessary (Waste: A Survey 1993). Even communal septic tanks need daily maintenance. Gaza already has a water and sanitation contract with *Lyonnaise des Eaux*/Khatib and Alami, entirely funded by the World Bank. Water losses have apparently declined and water quality has improved, although the company says that municipal employees don't carry out regular inspections and chlorination regimens (Saghir et al. 1998). Middle East and international groups should jointly support analyses of such private-public partnerships, including the feasibility of step-wise privatization through regulatory controls, management contracts, and sequential fees. In-country or *unilateral measures* should be also financed without complicated region-wide discussions.

Capacity building in selected cities and townships should be made a priority by international negotiators. Local governments or municipal utilities have to be induced to maintain the systems and treat wastewater. Community NGOs and health practitioners have to be harnessed to teach sanitary

[20]Sewage Endangers Jericho's Water Supply, *Ha'aretz*, 21 February 2000.

[21]Reported in the Water and Sanitation Program of the World Bank Group. Availabel at <www.worldbank.org>.

practices and to hold their local water authorities accountable. The World Health Organization has found that communities are more likely to support and sustain sanitary investments if the feasible choices are researched and presented to them. These choices are best presented in everyday Arabic, Hebrew, and English, as videos and booklets. This is an exercise that the multilateral track could easily facilitate.

Wastewater Reuse

Almost 75 percent of the freshwater in the Middle East goes to irrigated agriculture, which is a low-value use for this scarce resource (Fisher 1995). Most of it is used only once, except in Egypt where irrigation water is recycled several times over. One possible means of conserving water is to reuse wastewater. About half the water used by households could be treated and used again for irrigation. At present almost all of it is treated as a waste product rather than as a potential resource, and its unsanitary disposal is an urban health hazard. Wastewater is, in fact, a resource in Israel, where 70 percent of once-used domestic water is reused in agriculture.[22] Treating wastewater is also one-third as expensive as desalinating saltwater.

Unlike most water in the Middle East, wastewater is not in dispute nor is its reuse an internationally charged issue, so the multilateral track need not overcome disparate political pressures in this arena. In the short run, the environment and water working groups should work toward minimum standards of treatment for reuse in irrigation. Rules for such irrigation need wide distribution in simple Hebrew and Arabic. For example, tree crops such as citrus may need secondary disinfected water, while chemically treated (but not disinfected) water could be acceptable for cotton (World Resources Institute 1990).

Eventually, higher common standards should be implemented in the region. These higher standards have to be *phased in*, because at present only Israel can afford higher quality treatment. Israel and Egypt already use treated water for agriculture and recreation, and their water experts could lead the effort to create region-appropriate guidelines.

The question of enforcement cannot be ignored if edible crops are to be irrigated using wastewater. (Nobody wants untreated water on their leafy greens, but how do consumers know that farmers are not doing this?). Extension efforts to shore up in-country monitoring and enforcement are essential. Existing institutions have to be modified so that farmers, extension agents, and government regulators are mutually accountable, an area of action/research that environmental diplomacy could facilitate. As an interim measure, the risks associated with wastewater irrigation could be reduced by using it at planting but not during the growing cycle, or by using it only on non-edible crops.

The multilateral working groups, and indeed all the water-related agencies in the region, should build on existing cooperative efforts by Israeli, Palestinian, and Jordanian water experts. They already jointly monitor, and share water quality data on, some aquifers and wells. In fact, the region's water professionals support a joint approach to water use and recycling, while state-run agencies are far more jealous of their autonomy and control (Scheumann and Schiffler 1998). Open dialogue, encouraged by non-regional parties, is the ideal forum in which to expand cooperation.

[22] Saudi Arabia, Egypt, and Syria also treat and reuse about 20 percent of their wastewater (FAO 1997).

TRAINING AND OUTREACH

The importance of building local confidence, competence, and awareness around present and future environmental issues can hardly be overstated (Hanemann 2000). This is especially true for low-to-middle income countries where economic development and environmental preservation are often seen as conflicting priorities. With the support of the multilaterals, training courses have been held in Cairo on the environment and in Amman on the health effects of pesticides (Peters 1996). Such training and education should not only be sustained, it should be extended beyond scientific and technical personnel to include social scientists, environmental conservationists, farmers' organizations, and NGOs with a track record of local leadership. Specifically, these groups provide the institutional insights on which effective technological implementation depends.

At the end of the day, successful projects and useful research outcomes depend crucially on social factors. These factors include financing arrangements (Who will be taxed to build a new health center and who will be subsidized?), and in-country capacity (Are there community health workers with both medical knowledge and access to the population?). They include navigating between the often-competing motives of agencies and individuals (Do local politicians want new clinics while local doctors want Arabic-language publications on hygiene?). In short, it is not enough to cooperate over the diagnosis of a problem—it is necessary to facilitate its implementation.

Agencies such as the UNDP and the World Bank, faced with decades of disappointing project outcomes, have now set up special units to include local partners and to understand the role of social networks.[23] Middle East environmental diplomacy also needs a strong social science and outreach component.

In addition, we recommend that technical workshops and seminars on water management, data analysis, and conservation be extended by teaching environmental impact assessment and project cost benefit analysis techniques. Engineers and economists are not always skilled in analytical impact assessment: environmental activists are not always skilled in cost benefit analysis. For instance, the desalination center in Oman, a fine example of multilateral cooperation, should research not only the technology and economics of desalination, but also the environmental impacts. About half a kilometer of prime coastal land is needed per desalination plant (Biswas et al. 1997). Large plants generate air pollution and heat, and the densely populated Middle Eastern coasts already have air pollution problems. The desalination process produces concentrated brine as waste and Jordan, for example, has no outlet for it but the coral-rich Gulf of Aqaba. What is the environmental cost of desalination? Is solar-powered desalination technically and financially viable? These important questions need to be asked, and a framework provided within which they can be answered.

Evaluating the impact of a project on the economy, population, and the local ecology

[23] The position papers of the World Bank and the UNDP on local partnerships, as well as information on some of their partners in the Middle East and elsewhere, can be found at The World Bank Group at <www.worldbank.org>; United Nations Development Program, Biodiversity Support, at <www.undp.org/bsps>; and UNDP Global Environment Facility at <www.undp.org/gef>.

is always an uncertain exercise. It has been critiqued, sometimes accurately, as a fig leaf for justifying projects that were going to be sanctioned anyway (Walthern 1988). Nevertheless, environmental impact assessment and cost benefit analysis are excellent training devices because they force researchers across national and disciplinary boundaries to confront one another's priorities, values, and constraints within a unified framework.

The use of environmental or cost benefit analyses in countries outside the United States and Western Europe is limited, because of limited expertise, resources, and data (Kennedy 1988). Different operational methods appropriate to different regions have not yet been formulated (Biswas et al. 1997). The development of region-appropriate impact assessment guidelines for water, energy, agriculture, and conservation is a natural candidate for environmental cooperation.

CONCLUSION AND RECOMMENDATIONS

In this paper we have argued that key *lessons from international water diplomacy* can be applied to Middle East environmental diplomacy. Our analysis of existing transboundary water agreements suggests that:

- Financially or strategically powerful parties to a negotiated settlement (for example, Israel) may have to shoulder the "burden of generosity" in the allocation of costs and benefits;[24]
- Third-party intervention (for example, from the multilateral working groups and the international community at large) should nudge negotiations forward by being neutral, and by strategically granting funds for infrastructure, research, and development; and
- Environmentally friendly measures should be phased in rather than wide-ranging from the start. In-country policies can be as effective as explicitly cooperative ones.

These pragmatic principles should inform environmental diplomacy regarding soil, air, and water quality, and the transformation of agricultural practices. Specifically, this paper has addressed cooperating to exchange food for water, to develop a regional integrated pest and pesticide management program, and to reclaim and recycle wastewater.

To replace *virtual water with real food*, we recommend that the parties:

- Increase the share of West Bank aquifer freshwater to Palestinian agriculture at least through 2015;
- Jointly monitor water withdrawals on each side of the aquifers;
- Continue to market 100 percent of the Palestinian fresh fruit and vegetable surplus in Israel;
- Expand truck farm cultivation in the West Bank;
- Decrease more expensive extra-regional fruit and vegetable imports to Israel;
- Compensate/negotiate with Israeli farmers so they accept lower produce prices; and
- Establish an international fund to subsidize regional IPM, desalination, and other water-related research.

To move the Middle East towards a *regional integrated pest management program*, and to ensure clean water, clean soil, and high-value agriculture, the countries should:

[24] This conclusion contradicts traditional bargaining theories, which predict that stronger partners can more or less dictate the terms of a bargain.

- Reshape current chemical-intensive pest control practices to reduce both pests and pesticide use;
- Give growers an economic incentive by showing them that IPM means reduced spending on pesticides—especially as pests rapidly develop resistance—and greater market competitiveness;
- Disseminate the results of successful local IPM experiences, especially for export crops such as citrus, cotton and vegetables;
- Encourage the Palestinian Authority to develop an integrated pest management strategy in cooperation with Israel and Jordan;
- Encourage SHAHAM, Israel's extension agency, to help develop extension efforts in Jordan and Palestine;
- Set up a multi-country professional establishment to match technical opportunities with farmer and consumer needs;
- Give the national Ministries of Agriculture incentives to cooperate on integrated pest management; and
- Allow for harmonization of product quality standards to develop cooperative marketing, aimed especially at the EU.

In addition, regional cooperation and extension efforts are necessary to:

- Disseminate simple instructions, in the local language, on the use and storage of pesticides and fungicides currently in use;
- Help farmers to store and (if possible) dispose of unused obsolete chemicals, so they do not leak into the soil and water;
- Use the financial strength of multilateral groups to favor chemical companies that agree to take back unused products or to assist farmers with their disposal; and
- Over time, wean farmers and industries off pesticide subsidies and protection through support prices and tax regulation.

Treating and reusing wastewater in irrigation serves two purposes: it improves health and sanitation in crowded urban centers and conserves freshwater for essential, non-agricultural uses. Phased implementation of region-wide standards, city-specific unilateral measures, and third-party financing are essential to diplomatic efforts in this arena. The next steps are to:

- Develop, possibly with the World Bank, simple methods to treat urban wastewater;
- Negotiate the financing and maintenance, and not just techniques, of treatments;
- Jointly analyze the potential for private-public partnerships in sanitation projects;
- Support and expand community NGOs and health practitioners, particularly in densely populated townships;
- Produce health and hygiene documents in simple Hebrew and Arabic;
- Start with minimum acceptable standards for wastewater treatment and reuse, and gradually phase in higher regional standards;
- Develop crop-specific wastewater reuse guidelines for irrigation, especially for the major regional crops (cotton, citrus, perennial fruit trees); and
- Design region-appropriate monitoring and enforcement mechanisms for wastewater reuse, especially for Jordan and Palestine.

Finally, we strongly support the expansion of *cross-border and cross-disciplinary training*, not only to "professionals" but also to civil institutions such as NGOs. In particular, training and outreach should include:

- Unified frameworks for the economic

and environmental analysis of projects, such as cost-benefit analysis and environmental impact analysis;
- Mediating conflicting priorities among and within countries; and
- Capacity-building partnerships with civil institutions on whom project implementation depends.

Training and outreach efforts may not offer immediate and visible results, but by raising a cadre of environmentally sophisticated analysts, they may have the most far-reaching and positive impacts on the region's fragile environment.

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