WATER DEMAND MANAGEMENT AS GOVERNANCE: LESSONS FROM THE MIDDLE EAST AND SOUTH AFRICA

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ABSTRACT
Reviews of water demand management in the Middle East and in South Africa, two of the most water-challenged areas of the world, show that water demand management is occurring in almost all nations, but without the breadth or strength that is required by their increasingly difficult water situation. It is not absent as a policy goal, but it remains secondary to supply management and very much secondary to reducing government expenditures. There is therefore great scope for further analytical work on water demand management and even greater scope for work on ways to promote its adoption. What is needed above all is to treat water demand management not just as a technology to apply or a program to deliver but as a form of governance – indeed, a form that is as critical to improving social, economic and environmental conditions as it is to saving water. Application of this governance concept to Israel and Palestine shows the need for new institutions for water demand management, and that both existing and new policies need to be formulated in order for water demand management to play the role that it should.

KEYWORDS*:* Governance; Israel; Palestine; South Africa; Water Conservation; Water Demand Management

Natural resources such as water do not determine socio-economic development; on the contrary, socio-economic development determines water management options. (Allan 2002)

It is not very radical to urge that water demand management (WDM) become *a* major option for resolving Israeli-Palestinian water conflicts. It is rather more radical to claim, as we do, that WDM should be *the* major option, and that as well as moving both nations toward sustainable water policies, it can also help resolve conflicts between them. The main purpose of this article is to provide evidence in support of that position. Further, we maintain that, if WDM can play so large a role in Israel and Palestine, it can do so anywhere in the Middle East and North Africa (MENA). In their natural endowments, Israel and Palestine fall near the middle of the regional spectrum – greater renewable supplies of fresh water than many MENA nations but less than others. As elsewhere in the region, Israel and Palestine also exhibit sharp intra-national variations – from north to south in Israel, and between the West Bank and Gaza in Palestine. Again as elsewhere in the region, they are both using fresh water unsustainably – mining aquifers, degrading water courses, and, in the case of Israel, using water that is not likely to be under Israeli control after a peace settlement.

WDM DECISIONS AS GOVERNANCE

In its simplest sense, water demand management means getting the most from the water we have. In more elaborated form, WDM includes any action that reduces the amount of fresh water we need, or that keeps water cleaner than it otherwise would be (Brooks, 2004). The important point is the breadth of the concept, which remains the same regardless of whether it is less water per unit of output or service, or less water because of lower growth, different technical choices, or changes in habits. It is the same whether talking about surface water or ground water or whether talking about average or peak demand. Though based on science and engineering, in almost every aspect human desires and actions play decisive roles. Therefore, water demand management is a governance concept – governing (in both senses of the word: moderating and managing) our requirements for good quality fresh water. Yes, there are technical issues to be solved; and, yes, cost-effectiveness is an important criterion for decision-making. However, they are determined by, not determinants of, the way we govern water.

We know more about the technologies for water demand management than we apply, and we also know a lot about the cost effectiveness of various WDM techniques (though we tend to ignore many of their

benefits, such as reducing the volume of wastewater to be treated). Despite considerable research on water conservation behaviour by social psychologists and geographers, means for promoting changes in practices and behaviour at larger scales and across sectors remain elusive (Thompson and Stoutemyer, 1991; Dickerson *et al.*, 1992; Aitken *et al*., 1994; de Oliver, 1999). To paraphrase Homer-Dixon (2003) who was writing about renewable energy in Canada, the obstacles to water demand management in MENA are mainly social, and the ingenuity we must supply to overcome them is also therefore mainly social.

It is this governance approach to WDM that is distinctly missing in MENA. Few governments regard WDM as an activity worthy of explicit attention in its own agency. Only rarely is WDM the main impetus for policy action with respect to supply or disposal of water. Even if policies avow support for WDM, they commonly falter in application and implementation. If water demand management is to aid in the resolution of water disputes between Israel and Palestine, and become a base for sustainable development, we must identify culture- and region-specific ways of promoting attitudes, incentives, and policies to establish WDM as both means and ends for improving social, economic and environmental conditions. Therefore, in the next section we explore to what extent and how WDM is already in use in MENA. In the following section, we explore to what extent and how it is used in South Africa, which shares many ecological and socio-economic characteristics with the Middle East.

WATER DEMAND MANAGEMENT (WDM) IN THE MIDDLE EAST

Over the course of 2002 and 2003, Canada's International Development Research Centre (IDRC), in collaboration with other donors, conducted four forums on water demand management for nations in the Middle East and North Africa (MENA). The purposes were, first, to assess the extent to which WDM is being applied in the region and, second, to identify gaps in knowledge about WDM. Key inputs to the forums came in the form of national case studies followed by workshop discussions, all of which can be found on a tri-lingual (Arabic, English and French) CD-ROM entitled *Water Demand Management Forum – Middle East and North Africa: Advocating Alternatives to Supply Management of Water Resources*, available from IDRC's offices in Cairo or Ottawa (www: idrc.ca). The results of the forums are summarized in a review by Brooks (2004), from which most of the material in this section is taken.[1]

[1] We are grateful for IDRC's permission to use this material. All references to costs or prices are based on US dollars in 2002.

Three of the four IDRC forums focused on water demand management. The remaining forum, on Public-Private Partnerships in Water, turned out to have little to do with WDM. Case studies from Jordan and Morocco show that government expenditures are down and performance of the water utility has improved, but not even the World Bank suggests that privatization will promote WDM (Grover, 2004). The only direct link between private participation and WDM is reduction in Unaccounted For Water. This link is not surprising as it has a direct effect on revenue with benefit-cost ratios reported (in the Tunisian Drinking Water Case Study) as high as 5:1.

Two general conclusions from the forums influence all other results. First, the main objective of government-funded WDM programs in MENA has been to cut budgets, not to save water. Effects on water use are assumed but rarely demonstrated and, even less often, quantified. Water management may be a general focus for research and policy in MENA, but specific focus on water demand management remains to be adequately developed. Second, few of the efforts for WDM in the region devote much attention to communities, families, or women. Though low-income people and small farmers receive water at low cost, little evidence has been collected on impacts on income or quality of life. Easing of women's work, and gains in maternal and child health, are mentioned but seldom evaluated. Water management is still largely not just a male domain but the domain of male engineers. As a result, we know a lot about technologies for water demand management, but little about the institutions or incentives that promote it. We know a lot about what does happen, but little about what could happen.

Water Re-Use (Rabat, Morocco; March 2002)
Re-use of urban wastewater is becoming more common throughout MENA. Most nations have major sanitation problems, and the need to manage wastewater is as much a driving force for re-use as is shortage of fresh water. Exceptions occur in coastal cities where sewage can be dumped directly into the sea. Rural areas also lag behind cities in re-use of treated sewage.

The main use for treated wastewater is irrigation, but there are many other uses: recharging aquifers, creating green belts, fixing sand dunes, watering golf courses, and providing cooling water for industry. Though most nations permit treated wastewater to be used for food crops, some nations have adopted restrictions that depend upon the level of treatment (and, in the case of Jordan, destroy crops violating those restrictions). Even so, many farmers continue to use raw wastewater for irrigation, particularly in peri-urban areas.

Economic information about wastewater re-use costs and benefits is disappointingly scarce. It would be particularly useful to know more about the *marginal* cost of wastewater re-use compared with normal wastewater treatment and release into wadis, or the *marginal* benefit to farmers from using recycled as opposed to fresh water. Some data did emerge from the case studies. The Tunisian case study indicates that tertiary treatment of wastewater adds 15 to 20% to the cost of secondary treatment, but total cost is still 30% below that of water from a new dam. The Algerian presentation suggests marginal costs of about 10 cents per cubic metre beyond those necessary for treatment and discharge.

Prices for treated wastewater vary widely from place to place, and typically are based on political judgment rather than cost. For example, golf courses in Morocco pay four times as much per cubic metre as do farmers. (Many nations aim to keep the cost of treated wastewater for farming below that of fresh water, and, as necessary, provide subsidies to maintain the differential.) Even where cost is a factor, it is treated from the perspective of accounting rather than any recognition that failure to treat wastewater imposes its own costs, whereas appropriate treatment and re-use can support economic development.

Water Valuation (Beirut, Lebanon; June 2002)
Few people in MENA question the general practice of pricing water. However, difficulties arise from the wide range of objectives sought from water valuation – greater efficiency, higher revenues, regional development, social equity and others. Though each is valid to one degree or another, there is no purely rational way to determine the appropriate balance among them, nor is there much indication of how the tradeoffs are balanced in any particular nation.

Water prices remain below costs in most sectors in all countries, and very much below costs in some (Saghir, 2004). Indeed, despite enormous differences in climate, water prices in MENA nations other than Israel are not much above those in Canada. In only a few nations do prices rise sharply enough with use to have a significant conservation effect. Further, efforts to reform water valuation are concentrated in urban areas with governments moving sslowly in the agricultural sector. This approach is politically understandable but questionable economically and ecologically given the share of water in MENA that goes to irrigation. Even where raising prices to cover full costs is avowed policy, it is typically applied only to a few sectors, notably tourism and industry.

Unfortunately absent from most of the discussion about valuation are data on price or income elasticity of demand. The common assumption – at least for household water – is that water is in such short supply that most nations are operating in an inelastic portion of the demand curve. However, in Tunisia, where attempts were made to identify impacts, a direct link was found between water prices and water use for households above subsistence levels. Similarly, when prices for irrigation water were raised, Tunisian farmers sensibly shifted to higher value crops. Estimates for Israel show that, at an equilibrium price, agricultural water use would drop by 24 to 36 percent (Becker and Lavee, 2002). Studies on price and income elasticity justify the policy of increasing block rates. Though not perfect – for example, higher rates could penalize poor people growing food in the city – they do tend to balance equity and efficiency.

Although WDM objectives may be served, the main objective of raising prices in most nations is solvency of the utility, not saving water and certainly not economic efficiency. The three goals are related, but they are not the same. Tariff structures designed to cut use would be higher than those to recover costs. The Jordanian case study showed that new water supply costs about $1 per cubic metre but is valued at over $5. Water priced to achieve economic efficiency would have typical families paying 5% of more of their income for water. As well, it is easier to explain to citizens why price should cover full cost than why it should equal marginal value.

The most evident use of water valuation as social policy is the common practice of providing some water at low or no cost to poor households. This goal is typically accomplished by what is often called a "social tariff" for the first block of consumption – typically around 25 cubic metres per household each quarter. For a six-person family, this provides the 50 litres per person-day commonly regarded as the minimum for an adequate lifestyle (Gleick, 2000). Unfortunately, rich and poor families alike benefit from the subsidy for the first block. Tunisia is tackling the problem by having those who consume in excess of the social block pay at the higher rate for the full, not the marginal, volume; subsequent blocks are priced marginally.

Pricing of agricultural water adds special complications. Nations that are extending irrigation to new areas typically reduce water prices to encourage settlement. Except to the extent that they allow for differences in socio-economic conditions (*i.e.*, a form of rural development), such differential valuation is questionable. Differences in productivity or distance from market should influence

farming systems and crop selection, not subsidy levels. However, most nations find it difficult to increases prices for irrigation water. At a minimum, increases must be coupled with: a) removal of price caps on the crops that use irrigation water; and b) controls on drilling and pumping, lest farmers simply shift from the priced to the un-priced source. A further complication is that, even where illegal, informal markets in agricultural water are common. (Studies of those markets would give a good clue to farmers' valuation of water.)

Participatory Irrigation Management (Cairo, Egypt; February 2003)

The single most important conclusion that emerged from the forum on participatory irrigation management (PIM) is the need for institutions that go beyond permitting to promoting the concept. The whole approach of decentralizing management of water implies a shift in emphasis "from infrastructure investment-based projects to institutional development – investment projects, thus, become structural components of longer-term programs" (Van Hofwegen, 2004). In too many cases, governments give PIM nominal support, but do not provide incentives, mechanisms and, as necessary, regulations to allow local management to flourish. Clearly, some governments are less enthusiastic about local water management than they claim – this despite strong evidence that PIM works. In each case study reported at the forum, water-use efficiency went up by 30 to 50% and energy use for pumping was cut in half (Attia, 2004). The increase in water efficiency does not necessarily imply a reduction in water use; more commonly, it means that tail-enders on the water system now get water regularly – greater equity and efficiency, but not less water use. Other, less well documented, benefits include reduction in conflict and a sense of empowerment that is said to improve family health and well-being (Brooks, 2002).

WATER DEMAND MANAGEMENT IN SOUTH AFRICA

In 1994 South Africa did not collapse into rioting and retribution, as some had predicted. Instead, long queues snaked out from the country's polling stations as millions of citizens voted for South Africa's first, democratically elected, government. The new African National Congress (ANC) government was to lead a "country of two worlds" – a highly developed, urban world populated mainly by its white citizens, and a less developed world of informal settlements and rural townships created during the apartheid regime.

Together, these worlds created a country inundated by urgent problems: a flagging economy based on a defunct social system; a society with high expectations and eager for (immediate) change; an

out-migration of the professional corps; and a set of environmental conditions that were limiting the potential for development. This section focuses on the environmental governance decisions made by the ANC during the post-1994 political climate. More specifically, the focus is on the significant water management decisions made to lessen the gap between the water services enjoyed by the minority versus the neglected majority. Water conservation and water demand management (WC/WDM), the terms commonly used in the South African literature have been progressively integrated into much of the decision making at local and national levels.

Two catalysts provided the context in which the government re-focused its water management efforts. First, a series of droughts reinforced the need for immediate action and better, long-term, decision-making. Second, the ANC's political agenda was dedicated to meeting its citizens' basic needs. In addition to education, employment, housing, and health care, these basic needs included the provision of water and wastewater services to the 14 million people that lacked safe drinking water or the 21 million lacking reliable sanitation in the neglected rural and informal settlements (Rothert, 2000). South Africa's quantitative realities– heavy water use by the agriculture and the mining industries, and rapidly escalating requirements because of population increases and urbanization – meant that decision makers had to start thinking about water management in new ways. However, it was also the government's social, moral, and historical obligations to the neglected majority that guided early water policy and implementation efforts.

While the traditional water management thinking still exists today, as with construction (and likely expansion) of the Lesotho Highlands Water Project, South African water managers at local and national levels have been investigating the potential of WC/WDM.. In some cases, this shift may conflict with the government's social agenda. The desire to provide cost-effective water services, improve use efficiency, and increase municipal revenues through increased tariffs can run counter to water and wastewater basic needs objectives. How South Africa resolves this dilemma – in a sense, by structuring its water philosophy and policies so that a few individuals (or industries) use less water so that more individuals have access – will be pertinent at a regional level.

This section will highlight these efforts with summaries of two case studies.[2] Case study One will focus on the the city of Hermanus.

[2] For more detailed information on the state of WDM in South Africa, please visit the IUCN project site for WDM at: http://www.iucn.org/places/rosa/wdm

Case study Two is an overview of legislative and institutional changes that have been developed nationally. These case studies illustrate the attempts to transform water management from a series of strategies, policies, and programs into cooperative governance inclusive of WC/WDM and social equity considerations.

Local-level WDM: Hermanus, South Africa

Urban water demand management and water conservation efforts in urban areas are not unknown in South Africa. However, most of the efforts have been short-term responses to crisis situations and predominately technical responses, such as pressure management and leak detection, household or industrial retrofitting, and infrastructure upgrades. Compared with these examples, the Hermanus campaign has been distinct in its comprehensive approach and inclusion of the 'social' aspects and may exemplify the South African government's commitment to water conservation and demand management – with all of its successes and controversies.

Situated along the coast of Western Cape province, one-hour east from Cape Town, Hermanus has grown from a small fishing village into a tourist destination for both vacationing urbanites and foreign tourists. Its population fluctuates from 19 000 off-season to a peak of 60 000 during the holiday period (December and January). The rapid social change in South Africa – with the ongoing migration from rural areas to more developed centres in the search for employment – has meant that the informal settlements have also expanded.

Greater Hermanus had an annual water allocation of 2.8 million cubic meters, which was initially expected to be sufficient until 2010. However, by the early 1990s the municipality had exceeded this allocation. Further estimates suggested that continued development would nearly double water requirements. Clearly, the Hermanus council and water manager had to review their options. Conventional supply augmentation, such as groundwater extraction and desalination, had high capital costs; expanding the nearby dam was even more expensive. Therefore, in collaboration with the national Department of Water Affairs and Forestry (DWAF), the municipality began to turn its attention to WD/WDM. The result was a 12-point program:

- An assurance of supply tariff
- An escalating block-rate tariff structure
- Clearing invasive alien plants in selected catchments ("Working for Water" project)
- School Water Audits

- Water Loss Management
- Retro-fit program
- Water-wise gardening
- Water-wise food production
- Pre-payment metering (Security meter)
- National Water Regulations (adopted as local by-laws)
- Communication strategies
- Informative and "Creative billing."

The Greater Hermanus Water Conservation Campaign (GHWCC) began officially in October 1996 with financial support from DWAF and the local municipality. Its overarching objective was to change the concept of water management in South Africa away from supply management to demand management, an effort that was seen not merely as the purview of water professionals but as the responsibility of every citizen. The campaign included both residential and business sectors but the various campaign components were introduced in a rolling start. After the first four months, and with only half the items implemented, the municipality identified a 32% reduction in per capita peak demand for bulk water and 20% increased revenue (van der Linde and Buckle, 2001). The additional revenues were reinvested in the retrofit program. Other direct benefits of the campaign were improved access, supply assurance, and greater repayment rates in the lower income areas, job creation and skill training, children's environmental education, and the growth of community awareness and attitudinal changes related to water issues. The GHWCC also illustrated that regular feedback between the municipality and the consumer would promote conservation and higher levels of cooperation. An indirect outcome has been the national and international recognition of the GHWCC as a role model in urban water demand management.

The Greater Hermanus Water Conservation Campaign is not without its critics. Initial support for the campaign (97% with 2% undecided) identified in the first year was challenged as the water regulations were strictly enforced (McQueen and Pieters, 1998). This became particularly evident after a series of 'wet' years altered the public's perception of water scarcity and the need for such comprehensive water conservation efforts. In some cases, municipal councillors were in the "hot seat" as the issues related to water conservation were politicized during a local election. A more damning critique was that the GHWCC actually exacerbated the socio-economic gaps between low-income residents – some of whom had difficulty paying the charges above the free block and had leaky or insecure connections – and visiting holidaymakers or higher income local people. Some of the low-income households also felt that the low block tariffs for

minimal use were still too expensive and that the charges themselves ran counter to their rights to water under the new South African Water Law. Within the management structure itself, there were ongoing tensions between the Treasury and the Water Management departments over whether the additional revenues should be allocated to a central fund or be dedicated to further water conservation efforts. Finally, the challenges of managing an extensive and multi-faceted campaign exceeded the limited human resources within the municipality. As of 2004, the conservation campaign was still being championed only by the town engineer who initiated the project.

This anecdotal evidence hints at some of the complexity associated with a community-based water conservation and demand management project. What complicated the Hermanus case, it seems, were the social inequities and priorities that characterized a post-apartheid community. Learning from the Hermanus case, with all of its success (*e.g.*, the support from higher levels of government, the school programs, its comprehensive communication strategy, its revenue generation and component implementation) and critiques (*e.g.*, the social inequity that was not adequately addressed) can be a valuable for other municipalities and regions.

WDM in the National Government

South Africa's water legislation has undergone massive changes since 1994. The antiquated 1956 Water Law was replaced with the new National Water Act in 1998. The Act supports water demand management and conservation, which it defines as "the efficient use and saving of water, achieved through measures such as water saving devices, water-efficiency processes, water demand management and water rationing." Within the act, water conservation is a specific aim to: "ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors … promoting the efficient, sustainable and beneficial use of water in the public interest." The Act also contains the *National Water Resources Strategy*, which aims to "set out the strategies, objectives, plans, guidelines and procedures of the Minister and institutional arrangements relating to the protection, use, development, conservation, management and control of water resources…" as well as outlining the "principles relating to water conservation and demand management."

To put the legislative authority into action, the federal government has pressed the WC/WDM initiative forward through DWAF, which in 1998 took the mandate "to facilitate the development of policies, strategies, projects and initiatives that will result in the efficient

utilization of water by all water consumers in South Africa" (DWAF, 1999). DWAF has implemented this mandate with a wide range of activities involving stakeholder leadership, strategy development, technical support, and advisory services. DWAF was also proactive in attempting to entrench support for the WC/WDM mandate within its own staff. Though there was generally a high level of support within DWAF, some parts of the department expressed concern about lack of transparency and collaboration, and regional offices anticipated problems with policy implementation. By and large, these problems were dealt with through an effective communication strategy that conveyed the WC/WDM mandate, priorities, collaborative opportunities, and lessons.

At the local level, DWAF has supported municipal efforts through the Water Services Act (108 of 1997) and the restructuring of water institutions. Among those parts of the Act relating to conservation and water demand management are clauses for:

- National standards for sustainable use of water resources for water services (S.9 (1)(c))
- Standards for water tariffs (S 10)
- Efforts to be made by water services institutions (S.73 (1)(j))
- Assisting, assessing, and monitoring local authority water services' water conservation development plans (S.12 – 16, 18).

The National Water Act also supports local level efforts in its provisions for catchment management agencies – specifically used by the national government to delegate responsibilities and involvement to the local level – and the water user associations. The primary function of water user associations is to operate and maintain infrastructure for their membership but they will, as required and capable, provide bulk water services on the municipality's behalf.

Learning from South African WDM

Transition toward a viable, fully implemented WC/WDM strategy in South Africa remains difficult. The South African office of the World Conservation Union (IUCN-SA) concluded that water demand management "is not yet an intrinsic part of water resource planning and management" within institutions or with water practioners and decision-makers (World Conservation Union, 2001:4). Even though there is ample evidence of progress toward the conceptualization of WC/WDM, the findings suggest that there might be a serious disconnect between the WDM awareness or information and actual policy implementation in the region (Hazelton *et al.*, 2002). Yet progress is being made within municipalities, through the efforts of

non-governmental and private organizations, and through DWAF's activities. Recognizing this social contribution – in a sense, the equal importance of institutional capacity, individual capabilities, commitment, and a willingness for collaboration at all levels of decision making – is likely just as critical as having the available technical and financial elements in place.

LESSONS AND ISSUES FOR ISRAEL AND PALESTINE

In this section, key issues and opportunities to move water demand management toward a strong governance role in Israel and in Palestine will be briefly outlined. The specific ways in which that role is implemented are sure to differ in the two nations. Such differences do not have their origin in points of principle but in differences in states of: a) economic development – Israel has a much higher national income than Palestine; and b) political development – Israel is an independent, democratic nation, whereas Palestine has been occupied militarily for most of the past four decades and constrained in water management, among other aspects of independence, throughout its history. Happily, both Israel and Palestine are well supplied with people experienced in water management in governments, in universities, and non-governmental organizations. Unhappily, in both nations water demand management continues to be treated as a technical issue without being embedded in its socio-economic and political context.

WDM and Saving Water

Though few people deny that WDM is important, most assume that WDM will reduce water use. This is not a good assumption, and it will be particular weak in Palestine. Analysis of linkages between WDM and saving water will likely show that the Israeli response will resemble what happens in richer nations (Gleick, 2003). Water withdrawals will be decoupled from population and economic growth, which will lead to stable or even declining absolute levels of water use. In contrast, the Palestinian response to WDM will resemble what happens in poorer nations. Water withdrawals will not only track population and economic growth but, for some time, will increase more rapidly to meet unmet needs. However, specific water use (the volume of water need for some task) will decline as end-use efficiency increases in the domestic and agricultural sectors.

Institutional Design for Water Demand Management

Almost all case studies and national presentations at the four WDM forums sponsored by IDRC criticize their national institutions managing water. If this is not remarkable in itself, the strength of the criticism is. Words, such as *mismanagement*, *obsolete*, *outdated*, *anarchic*, and *lack of motivation*, frequently appear (Brooks, 2004).

Quasi-independent agencies, as with those that manage the Litani and the Jordan River basins, are regarded as performing better than other water agencies, but they are by no means exempt from criticism.

Apart from a common separation of the institutions for drinking water from those for irrigation, and from a tendency to centralize direction and decentralize operations, views on appropriate institutional design vary widely. It is not clear which tasks should and which should not be assigned to the central agency, or where agencies for WDM should be placed in bureaucratic hierarchies. Experience with energy suggests that significant progress will not occur unless some agency is given specific responsibility for water use efficiency and unless that agency has sufficient ranking in the bureaucracy and sufficient budget to affect decision making. No one argues that there is no one best way to organize for WDM, but greater success is apparent when responsibility for both fresh water supply and wastewater disposal lie within the same structure. Intellectual and judicial independence from central government also seems to help.

Extensions of Existing Policies

There is broad agreement in MENA about the need to allow water prices to increase until they cover full costs, but much less agreement about how to help those households that cannot afford to pay more. Saghir (2004) suggests that, instead of subsidizing the price of water, we instead **subsidize access to** water. As Palestine moves toward managing its own water systems, this approach could reduce budget outlays and increase effectiveness. Lower connection fees and increasing block rates would go far toward this result. If, however, governments prefer to offer water at subsidized prices to low-income people, they need to be more imaginative about designing the rate structure to avoid transferring the much of the subsidy to richer consumers.

Distortions in **pricing of agricultural water** are rationalized as a way either to support small or remote farmers, or to maintain national security and foreign exchange earnings. Both sets of criteria need to be justified, but almost surely the former are more appropriate than the latter. Even there, it would likely be more appropriate to find ways to improve farming practices and provide better ways to get products to market. On the other hand, great care should be exercised before removing existing non-price methods for allocating and distributing water among small farmers. Traditional methods always have some embedded elements of both efficiency and equity. Where they typically fail is in accommodating to modern market conditions.

The range of policies and practices for **pricing treated wastewater** is

very wide. It is not even clear how to determine what is the economically ideal pricing patterns (taking account, among other things, for avoided environmental damages and lower total waste disposal costs). Related work should also seek to establish pricing patterns that put the burden of wastewater treatment on those who cause the pollution while simultaneously making farmers and industries that can use treated wastewater pay for the additional treatment and distribution costs. At local levels, pricing patterns that promote the re-use of greywater for market gardens, something that is becoming more common in Jordan and Palestine (Faruqui *et al.*, 2002), also deserves attention.

Making **multi-stakeholder participation** work over greater geographic areas and at higher management levels has great potential (delli Priscoli, 2004). Can participatory irrigation management, for example, be extended from local feeder and district canals? And, if participation is so appropriate for irrigation, why not something comparable for household water in urban neighbourhoods? Guidelines are needed for matching higher and lower levels of authority, with due attention to varying livelihoods, cultural patterns, and hydrological conditions (Narain, 2004). Ironically, this sort of approach might be equally applicable to Israel's heavily centralized system and Palestine's somewhat chaotic decentralized system. Palestine could lead the way, given the role that NGOs such as the Palestine Hydrology Group and Ma'an have played.

Extending the Concept of WDM

To now, the role assigned to WDM has been limited, but, once conceived as governance, the opportunities multiply. We note a few very briefly below. In addition, macro issues, such as rates of demographic growth (Naff, 1996) and changes in industrial structure (Beaumont, 1994; Becker and Lavee, 2002), should be considered as part of a full WDM strategy.

If **global climate change** models are correct, the region will experience more frequent and longer droughts in the future. Adaptive water demand management strategies could make MENA more resilient to drought, but significant study would be needed to determine which measures, and how and when they should be applied (Moench and Dixit, 2004).

Though really a supply technology, **rainwater harvesting** is so much a part of local management, and so dependent on strategies to moderate demand, that it is conveniently considered as part of WDM. What is needed today are policies that can promote its role in water management at household and community levels, and that link

rainwater harvesting to efforts to increase revenue generation from markets outside the local community.

Extraction of groundwater is more tightly controlled in Israel than in Palestine (Trottier, 1999). The research question is not *whether* to control well drilling, but *how to do so*. Groundwater is a resource that belongs to the public, and, in principle, no one should have the right to withdraw it without payment for its value. Recent work on what is coming to be called the 6th Great Lake (the groundwater basin) in North America suggests the analysis needed in MENA to "take into account water quantity, quality and ecosystem integrity" (Galloway and Pentland, 2003).

Israel is contemplating **private sector participation** for water (Chenoweth, 2004), but not Palestine. Given Israel's essentially complete coverage of water metres and its relatively efficient delivery system, the record does not lead one to expect any major gains in WDM from the private sector. However, more imaginative approaches can be devised, as with energy service companies that take over energy management of industrial plants and residential complexes and make profits from re-designing the system for greater efficiency at no increase in cost to consumers. The WDM past of private sector may not be a good guide to its future.

CONCLUSION

Apart from those issues specific to their conflict, the fresh water problems of Israel and Palestine do not differ markedly from problems elsewhere in the region. The MENA region includes nearly three-fourths of the nations in the world with internal renewable fresh water resources below 1000 cubic metres per capita. Despite scarcity, demand management has historically received far less attention than supply management. This situation has to change, and not just by introducing new techniques but by treating water demand management as a major component of governance. The region has both the opportunity to become a world leader in demonstrating how water demand management can bring about major improvements in quality of life and in standard of living for its citizens. Perhaps the message is getting through. The Conference on Water Demand Management held in Jordan in 2004 (http://www.mwi.gov.jo/IWDMCP/Index/MON.htm), and attended by 742 people from 38 countries, would have been unthinkable just a few years ago.

Though linked in water scarcity with the rest of MENA, the greatest impetus for WDM in Israel and Palestine may come not from pressures to improve efficiency but from the imperatives of the peace

process. Almost every significant watercourse on which they depend is shared by the two nations. When a peace treaty is signed between them, formal arrangements, much like those in Annex 2 of the peace treaty between Israel and Jordan, will have to be included. Only if both nations go much further in water demand management – not just intentions, but actual implementation – will such arrangements be feasible. Israel and Palestine have much more to gain from cooperation than from conflict over water, and a large part of that cooperation will be water demand management practices promulgated and enforced within each nation individually.

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