ground water

Institutional Conditions for IWRM: The Israeli Case

by Itay Fischhendler

Abstract

Many places in the world are experiencing a water crisis. This water crisis is attributed to a governance crisis, whereas often fragmented institutional and physical water structures are used to explain a policy of overexploitation. The Israeli water system, which adopted integrated water resource management (IWRM), is often cited as a model for other countries struggling with fragmented water systems. Yet, despite the exceptional degree of integration, Israel in the past two decades has adopted an unsustainable water policy. The aim of this study is to understand this failure and thereby to postulate on the institutional conditions required for successful implementation of IWRM. The study focuses on the politics of water allocation during the drought of 1999 to 2002. It was found that the failure originates in setting administrative divisions in the decision-making process and in differential checks, with no balances implicitly instituted within the integrated water system. These two factors have resulted in a water system that is physically integrated but is not coupled by a balanced institutional structure. This case study teaches us that when reforming the water sector along IWRM lines, measures must be taken to ensure that the physical integration coincides with a balanced institutional integration—otherwise the results may be worse than if there were no integration at all.

A Quest for Integrated Water Resource Management

Many places in the world are experiencing a water crisis related to inadequate access to clean water and the inability to sustain ecological ecosystems (UNDP 2006). In fact, the Millennium Development Goals set by the UN in 2000 identified that around 1.1 billion people have no access to safe drinking water and basic sanitation; as a result, 1.6 million people die every year from diarrheal diseases (World Health Organization 2007). In contrast to the past, when the water crisis was attributed to climatic conditions, currently it is widely acknowledged to be largely a governance crisis. Inadequate governance was used as a variable to explain the water crisis in many places, such as Israel, Mexico, Jordan, Spain, and the western United States. Although widely used, the concept of governance has taken a number of meanings (Pierre and Peters 2005, 1). This article uses this term in the sense of the establishment and operation of institutions that serve to define social practices, assign roles, and guide interaction among the occupants (Young 1994, 15). In the water sector, this can take the form of water authorities that issue water rights, price water, and coordinate between the different regulatory agencies and players.

The governance crisis is attributed to several factors, including the overriding political nature of decisions, a supply-oriented policy that results in the failure of water institutions to address issues of equity and sustainability (Gleick 1998), a lack of accountability and transparency in the decision-making process (Blomquist and Schlager 2005), weak water laws to balance competing upstream-downstream uses (Wouters 2000), and inappropriate scale of water management (Fischhendler and Feitelson 2003). Other factors have focused on the high transaction costs of coordinating between the different components of the water system (Saleth and Dinar 2005) and inflexible allocation systems that are assumed to impair the ability to adapt to climate fluctuation.

One factor that may explain weak governance that results in overexploitation is fragmented physical and institutional structures (Teclaff 1996; Molle et al. 2006). Water structures that are narrow in both scope and scale, although found to provide social benefits, stop short of exploiting economies of scale or internalizing

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externalities (Blatter and Ingram 2000). The implications of the fragmentation of the water sector are often used to justify the need for the adoption of integrated water resource management (IWRM). IWRM seeks to replace those isolated practices and create a process that can bring together fragmented water uses and users into an integrated planning, allocation, and management framework (Molle et al. 2006). It stresses the watershed as the management unit, local-regional partnerships, unified management of both land and water, and even a shift from an inflexible allocation system based on water rights to an adjustable system that can advance demand side management. All this is assumed to increase the adaptability against unforeseen conditions such as droughts or floods. Places like Australia, UK, western United States, and Chile have already adopted some elements of the IWRM in order to improve their water and ecological services (Watson 2007; Christensen and Lintner 2007). Thus, not surprisingly, IWRM was endorsed by the 2000 Summit on Sustainable Development in Johannesburg and by the 3rd (2003) World Water Forum. It was also adopted as a prerequisite for compliance with the European Union's Water Framework Directive of 2000 and has guided many of the subsequent EU water development programs, such as the EU Water Initiative (EUWI 2004). Consequently, as of the writing of this article, 90 countries have engaged in attempts to implement components of IWRM (UN-Water 2007), including places such as Sri Lanka, Thailand, Indonesia, and Vietnam (Shah and Van Koppen 2006).

Although widely endorsed by international organizations, NGOs, and scientists, IWRM suffers from very limited practical applications (Walther 1987; Biswas 2004). Consequently, researchers began to question the practicality and even the desirability of integrated water management; some even claim that it is a "holy grail" that cannot be implemented at all (Bartlett 1990). The failure of the IWRM was often attributed to its poor conceptualization (Born and Sonzogni 1995), lack of the information required to coordinate everything from land-use planning to biological systems (Newson 1997), and social and administrative constraints (Watson 2007). The term "social" particularly implies the politics that underlies water management and the constructions of IWRM institutions (Blomquist and Schlager 2005).

While there are several studies that acknowledge difficulties in implementing IWRM, the question of why IWRM, once actually adopted, often still fails to provide its expected outcome is relatively unexplored. In particular, there is a need to examine the institutional conditions necessary for IWRM to deliver sustainable water allocations. Since Israel has developed an extraordinarily comprehensive water management structure that is cited as a model for IWRM for other countries (Postel 1997), examining its successes and failures can highlight the conditions required for successful implementation of IWRM.

The Israeli Crisis

Despite the exceptional degree of centralization and comprehensiveness of the water management system in Israel, the rate of abstractions since the 1970s has been consistently greater that that of replenishment, except for a few exceptionally rainy years (Figure 1). Over-exploitation occurred predominantly in the Mountain Aquifer and the Coastal Aquifer, which together provide between 50% and 87% of Israel's total fresh water consumption, depending on the abstraction rates from Lake Kinneret (often called the Sea of Galilee), the third primary source of fresh water in Israel. Until 2005, the majority of this water was consumed by the agricultural sector. Since 2005, urban fresh water has increased and consumes roughly 52%, while agricultural water use was reduced to only 40%. The remaining 8% is consumed by the industrial sector. The implications of the over-exploitation policy were already felt during the two periods of drought in 1984 to 1986 and 1989 to 1991. In

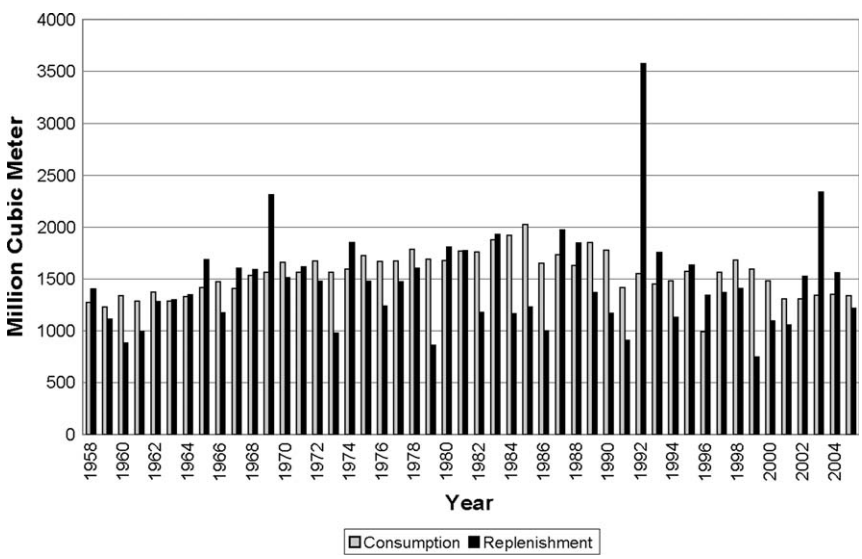

Figure 1. Consumption and replenishment of fresh water in Israel.

1989, for example, the consumption rate exceeded replenishment by 478 million cubic meters (hereafter mcm) (Figure 1). Because of the extraction policy, in 1989, the water levels of both the Mountain Aquifer and Lake Kinneret fell below their red-lines. The red-lines mark estimates of the lowest water levels thought to be allowable without causing long-term damage to the system. Thus, they serve as warning signals for managers and are meant to represent the lowest levels administratively allowed. Reducing the water levels in both the surface and the aquifers had several adverse implications, some irreversible (Gvirtzman 2002).

Since the late 1960s, some 19 reports have been submitted to the various water commissioners criticizing the extent of pumping and calling for a change of policies. All the reports emphasized the need to increase water tariffs and reduce the allocation of fresh water for agricultural purposes, replacing them with recycled waste water. Yet, these recommendations went largely unadopted and the replacement of fresh water by treated waste water was limited until the late 1990s. As a result, overexploitation continued and was exacerbated during the drought of 1999 to 2002. The result was the repeated lowering of Lake Kinneret red-lines on four different occasions to unprecedented lows (Feitelson et al. 2005) and the breaching of the unofficial red-line of the Mountain Aquifer, causing an increase in the salinity of the water resources (Sukenik 2003).

The aim of this study is to understand the failure to regulate the use of the limited water resources despite Israel's high level of integration and thereby to identify some of the institutional conditions necessary for successful implementation of IWRM. It is argued here that this failure originates in institutional structures that have empowered the agricultural interest groups while eroding the ability of other stakeholders to have a say on water allocations. The result is a water system that is physically integrated but not coupled with a balanced institutional structure—and this has led to a policy of overexploitation.

The study focuses on the decision-making process and the politics of water allocation during the drought of 1999 to 2002. Interviews were conducted with many of the key players involved in that period. In addition, many primary documents were reviewed, among them correspondences between the Water Commission and the other branches involved in water administration. Although many of Israel's water resources are shared with Jordan, Lebanon, and the Palestinian Authority, the transboundary aspect of water management is beyond the scope of this paper. The transboundary aspect is heavily covered by many other studies, including, for example, Benvenisti and Gvirtzman (1993) and National Academy of Sciences (1999).

The article begins with a brief review of the facets of Israel's "Zionist water ideology" and its subsequent IWRM structure. The section "The Process of Water Allocations: The Drought of 1999 to 2002" examines how the integrated system functions in real time by focusing on the process of water allocation during the drought of 1999 to 2002. The section "Discussion: Exploring the Rationing Impasse" identifies three of the driving forces in water allocations and their effect on the performance of IWRM in Israel. Finally, the article, based on the Israeli case, postulates the institutional conditions for successful implementation of IWRM.

A Water Integration–Driven Ideology

In Israel, water was not regarded as a mere economic resource but as an input to the creation of a new society in the land of Israel (Galnoor 1978). The society was founded upon the ethos of development (De-Shalit 1995) and the Zionist ideologies. Several ideological factors came into play. Both because of ideological notions of equity and in order to encourage settlement and development throughout the country, the first factor was spatial equality under which all areas within the state would receive water of the same quality and at the same price, regardless of its true cost—often a function of the proximity to the water resources. To this end, a balancing fund was established that cross-subsidized the expensive water against taxation of the cheap water (Hochman and Hochman 1991). The second ideological factor specifically stipulated settlement of the Negev desert, without almost any regard to the economic costs. As stated by the late Simcha Blass, the chief engineer of Mekorot (the national water company) in the state's early days, the diameter of the pipeline that transferred the water from the Yarkon River in Tel Aviv to the Negev in the south was designed to address the Zionist ideology rather than the economic constraints of the fledgling state, and the Negev in particular (Blass 1973). The third ideological factor called for the building of an agrarian society. This ideology gave precedence to the agricultural sector and gave absolute authority to the central state (Feitelson and Allan 1997). Since water was the main raw material for building an agrarian society, not surprisingly, ample water was provided to the agricultural sector below its true cost. The subsidy for agricultural water comes from the residential water users and from taxpayers in general (Becker and Lavee 2002). In addition to Zionist ideology calling for a return to the land, an important additional factor that contributed to the creation of an agrarian society was the desire for secure food supplies for the newborn nation. Food security gave precedence to the agricultural sector and hence required irrigation. It also assured sufficient income to maintain an agrarian way of life. The fourth factor was the ideology of statism, which placed the state at the center. It required the development of both the water and the agricultural sector in a centrally organized and cohesive manner since it was meant to serve as a tool for achieving broad national goals (Aharoni 1991, 146–148). It also served as a justification for the redirection of water away from its natural courses and the advancement of a hydrological imperative as part of state building.

To implement the Zionist agricultural ideology, the National Water Carrier was constructed connecting Lake Kinneret in the north to the northern Negev in the south (Figure 2) in 1964. As a result, the nation's one lake and its major aquifers were interconnected and a single unitary system was established. This physical integration signified the end of the hydraulic mission era in the history

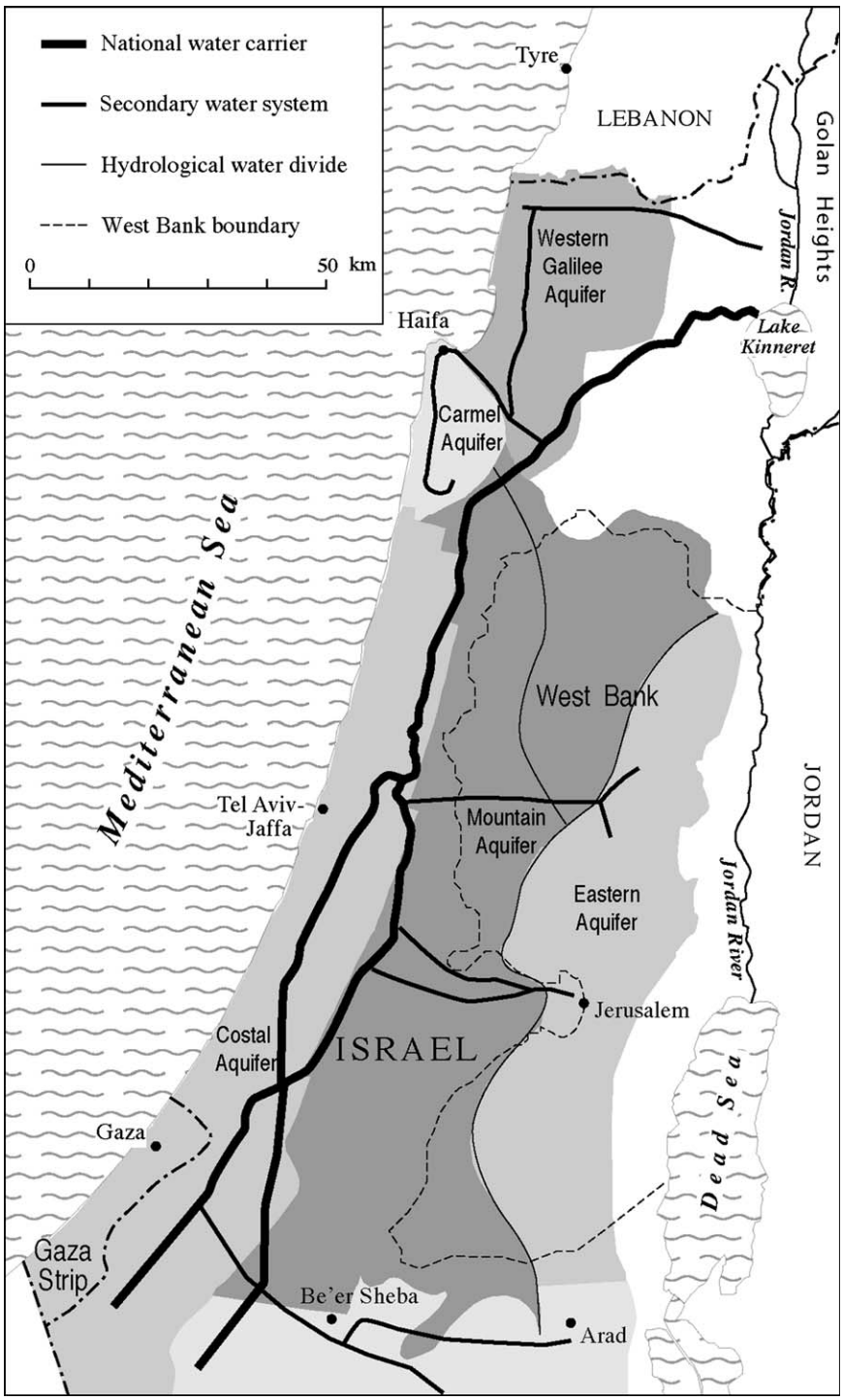

Figure 2. The Israeli water system. The map was taken from Feitelson (2006).

of Israeli water management (Galnoor 1978). From this point onward, the emphasis shifted to the allocation of existing resources.

A very detailed and comprehensive Water Law was adopted in 1959. The law vested the ownership of all water resources in the state and formalized the concept of a centralized water system (Galnoor 1978). Parliamentary responsibility for the management of water, in the form of a Water Commission, was left in the hands of the Ministry of Agriculture, and a water commissioner was entrusted to determine and carry out the water policies. Until 1990, the water commissioner came from the agricultural sector (Feitelson 2005). Extensive power was given to the water commissioner, including the establishment of water projects, water appropriation, the prevention of water contamination, and flood protection. To ensure that the commissioner followed the agrarian mission, a Water Council, most of whose members were from the agricultural sector, was also established. Finally, an Operation Committee was founded to advise the commissioner on water-related issues. In 1996, the Water Commission was transferred to the Ministry of Infrastructure. Yet, the responsibilities over water tariffs for agriculture and the distribution of water within the agrarian sector were left in the hands of the Ministry of Agriculture. Later, as the water sector had to address new aspects of

the water system, for example, health and environment, the responsibilities over water were fragmented between several ministers. No laws, regulations, or procedures were set to ensure coordination among the different ministries. Table 1 summarizes the predominant facets of the Zionist ideologies, the bodies responsible for implementing the ideologies, the available tools for implementation, and the water policy implications. Figure 2 depicts the Israeli water system.

The Process of Water Allocations: The Drought of 1999 to 2002

To understand how, despite its extraordinary integrated water system, Israel has adopted an unsustainable water policy, the process of water allocation during the drought of 1999 to 2002 is examined on a year-by-year basis. The drivers, players, and tools that advanced a policy of overexploitation are also traced on a year-by-year basis.

Allocations of 1999

Following many years of overexploitation of water resources (Figure 1), the academic and professional community warned that should 1999 be a drought year the water sector would experience a crisis as water levels in all reservoirs were already low (Golani 2003). Consequently, the Operation Committee planned a reduction of around 25% in the allocation of water to the agricultural sector relative to the baseline set in 1989 (Operation Committee 1999). Yet, while the Israeli parliament was still discussing the situation, the water commissioner was faced with a strong opposition to the scheduled water rationing from various parties in the political arena. The opposition emphasized the many positive externalities agriculture provides, including maintaining Jewish cultivation of land, food security, preserving open spaces, and the ability to absorb treated and partially treated waste water (Goldsmith 1998).

As the scholars and experts had warned, in the winter of 1998 to 1999, the region experienced a record low in the century of rainfall (Bachmat and Khalid 2004). To address the growing water demand in the face of the drought, the Cabinet decided that in the future the agricultural sector would receive an annual quota of 1160 mcm of water, of which only 530 mcm would be fresh water and the remainder being recycled water. In the meantime, the red-line of Lake Kinneret was lowered to allow the further supply of water quotas that were set before the beginning of the winter. Meir Ben Meir, the water commissioner, wishing to maintain the allocation to the agricultural sector while not irreversibly exploiting the water resources, asked the parliament to issue an emergency decree that would enforce a water reduction on all sectors and not only on the agricultural sector as initially planned. The intention was to prevent a larger cutback to the agricultural sector. The cabinet accepted the request but conditioned the cutbacks on financial compensation to the farmers for the reduced water allocations. Compensation was approved by the Ministry of Finance, which then set stiff eligibility criteria for receiving the compensation. However, due to the pressure from the agriculture lobby half a year later, these criteria were modified by the parliament to allow more farmers to receive compensation (Cohen 1999a). Ultimately, the 40% cutbacks in the agricultural sector that were scheduled as part of the emergency decree dwindled to 27%. The difference was provided by overexploitation from the Mountain Aquifer.

The result of limited water rationing during a year in which the replenishment rate was only 47% resulted in the consumption of 847 mcm beyond replenishment in 1999 (Figure 1). It was also this overdraft policy that advanced a cabinet decision in 1999 to initiate construction of a desalinization plant to produce 50 mcm/year.

Allocations of 2000

For the year 2000, the water commissioner scheduled a 40% reduction of allocations to the agricultural sector. This cutback was despite the recommendation of the Hydrological Service and Mekorot to enact a 75% reduction (Kesler 1999; Tal 1999, respectively) in order to prevent the breaching of red-lines in both the Lake Kinneret

Table 1
Zionist Ideology, Water Tools for Implementation, and Implications

Ideology	Responsibility	Tools for Implementation	Water Policy Implications
Spatial equality	Israeli parliament	Balancing fund	Subsidies for the agricultural sector
	Water commissioner	Water quality and quantity standardization	Exclusion of the private sector
		National Water Law	Centralization
Settlement of the Negev	Mekorot	National Water Carrier East Line	Regional tension over water
	Israeli National Planning Boards	National Water Law	
Agrarian society	Israeli parliament	Water commissioner under the Ministry of Agriculture	Low water tariffs and high water quotas for agriculture
	Ministry of Agriculture	National Water Carrier	
Statism	Israeli parliament	National Water Carrier	Minimal representation for civil society and minorities
	Ministry of Agriculture	Israeli Water Law	
		Centralized water institutions	

and the Mountain Aquifer (Haklai 1999). This steep water reduction was strongly criticized by the agricultural sector in the parliament Committee of Interior and Environment and in the parliament Oversight Committee. Again, the contribution of positive externalities from agricultural activities was cited (Ben Meir 1999).

The Water Council decided to accept the rationing as long as the farmers would be adequately compensated and as long as the 20% increase in water tariffs suggested by the Ministry of Finance would be withdrawn (Cohen 1999b). The 40% rationing was finally approved and the water tariff was raised by 7% rather than 20%, as originally suggested. The 7% increase became possible when the Finance Ministry announced it would uphold the payment of the previous year's financial compensation as long as the Ministry of Agriculture would reject the new tariffs (Tamari 2003).

As the early winter of 1999 to 2000 was dry, the water commissioner twice lowered the red-line in Lake Kinneret in order to maintain the supply of water for that year, hoping the rest of the winter would be wet (Feitelson et al. 2005). The Operation Committee, facing an unprecedented decline in the lake's levels, recommended that should the drought continue an emergency decree be reissued that would allow an additional 20% cut from the water quotas to the agricultural sector (Cohen 1999c). As the winter continued to be dry, the agricultural sector, fearing further reductions in their water supply, launched a campaign aimed at highlighting the importance of agricultural activities. Since the option of cutbacks by emergency decree was rejected by Prime Minister Ariel Sharon, a farmer himself who was closely aligned with the agricultural lobby, the water commissioner lowered the Lake Kinneret red-line again and the additional 20% water reduction was not adopted. Ultimately, the 60% cutbacks in the agricultural sector that were required to protect the water resources dwindled to only 33%. The result of the limited water cutbacks during a year in which the replenishment rate was 68% was that in 2000, 385 mcm was consumed beyond the replenishment.

Allocations of 2001

During the summer of 2000, a new water commissioner was nominated. This new commissioner was a water professional without direct ties to the agricultural community. Given the crisis and the fear that the coming year may also be dry, he requested a 56% rationing in allocations to the agricultural sector (Tal 2003). He also issued regulations that would allow the commissioner to slash up to 75% in water allocations to the agricultural sector if 2001 would also be a drought year (Appeal to the Supreme Court 2000).

The Water Council, supported by the Minister of Agriculture, rejected these regulations and pursued a reduction of less than 50% while emphasizing the merits of agriculture (Golani 2003). In addition, the agricultural unions appealed to the Supreme Court, arguing that the water commissioner was not authorized to issue these regulations (Appeal to the Supreme Court 2000). Since the Ministry of Finance approved compensating the farmers only for 50% rationing and the Minister of Infrastructure refused to approve a 56% cutback, the water commissioner was forced to reconsider his request. Finally, he asked the Water Council to approve only a 50% cutback, knowing the difference would be provided by overexploiting the Coastal Aquifer (Operation Committee 2000). Thus, only 50% rationing was approved for this year.

As the winter of 2001 to 2002 was dry, the Water Commission realized that an additional rationing of 17% was needed to address the water shortage (Cohen 2001a) or else it would be necessary to further deplete the water reservoirs and breach their red-lines (Operation Committee 2000). The water commissioner requested that the Minister of Infrastructure cut water supply to the agricultural sector by an additional 10% (Tal 2001). The Ministry of Agriculture blocked this step by refusing to sign a decree that stated how the cutback would be divided between the different agricultural users (Blitz 2001). Instead, the prime minister opted to further exploit the Coastal Aquifer, to proceed with the development of new water resources, and to maintain the existing water tariffs for the agricultural sector (Cohen 2001b, 2001c). Given this impasse, and despite the need to slash water supply for agriculture beyond 50%, the water commissioner, in order to maintain the existing water provisions, had to again lower the red-lines in Lake Kinneret by 1.5 m (Tal 2001).

Ultimately, the 75% cutbacks in the agricultural sector that were required to protect the water resources dwindled to 45%. The result of the limited cutbacks despite a replenishment rate of only 66% was that in 2001, 252 mcm of water was consumed beyond the replenishment rate (Figure 1). To overcome the overdraft, the cabinet decided to continue with a supply oriented policy and called for enlarging the scale of desalinization from 50 to 200 mcm/year.

Allocations of 2002

Following 3 years of continuous drought, toward the winter of 2001 to 2002, several steps were taken. The first was the establishment of a new Parliamentarian Committee to examine the water crisis. The second step was the water commissioner's recommendation to issue a 73% reduction in the allocation of water to the agricultural sector and to cut urban water consumption (Golani 2003). Such a cutback was necessary for stopping the increase in the salinity levels of the water resources due to the ongoing overexploitation.

As previously stated, the commissioner had to confront a strong agricultural lobby that included the agricultural unions, parliament members, and the Ministry of Infrastructure (Blitz 2005). The Water Council rejected the cutback and the Ministry of Agriculture blocked it, as before, by refusing to sign the document outlining the distribution of the cutbacks. Also, the agricultural unions appealed to the Supreme Court to stop the action. The Supreme Court, however, advised them to withdraw their appeal, which suggested that the likelihood of their winning was slim (Tamari 2003). Finally, it was the prime minister who decided to cut water by only 50% on the basis of agriculture's contribution to Jewish settlement and instead to intensify the exploitation of the Coastal Aquifer (Cohen 2002). Ultimately, the 73% cutbacks in

the agricultural sector that were required to protect the water resources dwindled to 44%. The result of this limited cutback in another dry year was the further exploitation of the Coastal Aquifer. This exacerbated the salinity levels in many wells, forcing their closure (Haklai 2002).

Discussion: Exploring the Rationing Impasse

The overexploitation processes as observed in the 1999 to 2002 drought underpin three major explanatory variables that affected the performance of the integrated system: administrative division, a system with checks and no balances, and the role of positive externalities and public goods provided by agriculture. This section explores each of these variables.

Administrative Division

The allocation process reveals that despite the physical integration of the water system, there were considerable administrative divisions, which meant that any decision to change water allocations (cuts being the most frequently recommended change) to the agricultural sector requires the support of several professionals, ministers, committees, and different branches of the government. These include the water commissioner, Water Council, Minister of Infrastructure, Minister of Finance, often the prime minister, the cabinet, and possibly even the Supreme Court. To understand the implications of this, the intricacies of the allocation process are spelled out in Figure 3.

When the water commissioner decides on a cutback (box 1), he has to consult the Water Council (box 2). The Water Council also provides a forum for the farmers to set their objections to suggested cutbacks (box 3); however, the water commissioner is not legally obliged to accept the opinion of the Water Council. Next, it is up to the Minister of Infrastructure to approve the suggested rationing (box 4). After the allocations are made, the commissioner cannot change them, unless the Ministry of Agriculture agrees.

Following the approval of the Minister of Infrastructure, the rationing is brought before the Minister of Agriculture. It is his responsibility to decide and publish how the cutback will be distributed among users (box 5) and to sign the regulations required to issue the cutback (box 6). The winter of 2001 to 2002 shows that by refusing to

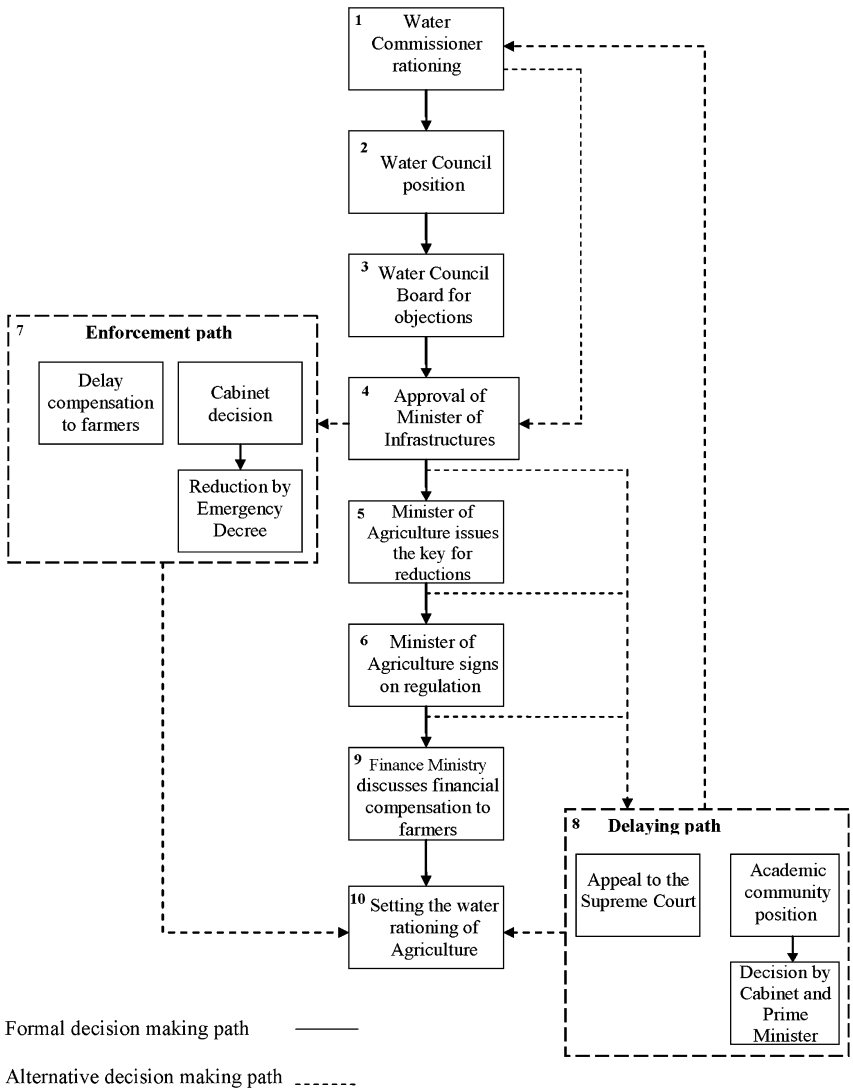

Figure 3. The process behind changing the water allocation to the agricultural sector.

state how the rationing would be divided among the users, the Minister of Agriculture can block the pending cutback. Finally, the Ministry of Agriculture can and often does condition its support for the cutback on financial compensation that has to be approved by the Finance Ministry (box 9); this was the case in the winter of 1999 to 2000.

The process of water allocation can be modified by a process that either enforces the rationing or delays it. The former is through a governmental decision that issues an emergency decree that sets the water appropriation, thereby circumventing the need for the approval of the Ministry of Agriculture for cutbacks (box 7). The issuance of such a decree, however, requires the approval of the prime minister. The winter of 1999 to 2000 is one example of a case in which the prime minister refused to sign an emergency decree. The latter process of delaying the cutback is through the agricultural lobby either by appealing to the Supreme Court to change the commissioner's decision or through lobbying parliament members and the prime minister to affect the commissioner's decision (box 8). The winter of 2001 to 2002, in which the prime minister rejected a 73% cutback on the basis of agriculture's positive externalities, is one example of this delay process.

The next section examines how checks and balances were or were not embodied within the water system to affect the overexploitation of the water resources.

Checks with No Balances

Checks are defined herein as the means available for the different sectors to block cutbacks in allocation of water to the various sectors. These were measured by identifying both the institutional tools available to each sector (and their effectiveness on allocations) and the level of representation of each of the different sectors in the various water institutions. Balances are viewed as a function of the distribution of the tools among the players and whether all legitimate players are adequately represented in the allocation process.

Table 2 summarizes the institutional tools each sector used and their effectiveness in influencing the allocation of water for agriculture as seen in the allocation process described previously during the drought of 1999 to 2002. Table 3 identifies the representation of sectors in the institutions affecting the water allocation.

Table 2 reveals that the agricultural sector has several tools available to reduce and even block water rationing. These include approaching the Supreme Court, recruiting the academic community, demanding financial compensation for the cutbacks, and lobbying the cabinet and the prime minister for support. The extensive use of these tools during the drought of 1999 to 2001 stresses their effectiveness. In addition, the agricultural sector, by means of its representation in all bodies involved in the allocation of water (Table 3), further succeeded in affecting many of the suggested water reductions.

In contrast to the numerous tools and high representation the agricultural sector enjoys in this sphere, other sectors are less well represented and equipped to affect the allocation process. For example, the Ministries of Environment and Tourism are not represented at all in the water institutions (Table 3). Also, the tools available to the water commissioner for implementing a scheduled water reduction in the agricultural sector are restricted to cutbacks by emergency decree, stressing the importance of the red-lines as well as of experts' and academics' support. The drought of 2000 underscores the high political cost of using the emergency decree and the

Table 2
The Institutional Tools for Influencing the Allocation of Water

Tool to Influence the Allocation of Water	Initiator	Aim of Tool	Time of Use	Effectiveness of Tool
Supreme Court	Agricultural sector	Reduction of the agricultural water cutback	2001 2002	Created political pressure
Not publishing the key for the water rationing	Minister of Agriculture	Reduction of the agricultural water cutback	2001 2002	Blocked the water cutbacks
Recruiting support of academic community	Agricultural lobby	Reduction of the agricultural water cutback Lowering of red-line	2001	The red-lines were breached
	Academic community	Protection of water levels	1999	Maintained the Kinneret red-lines
Cutback conditioned on compensation	Agricultural sector	Blocking of cutback in agricultural allocation	2001	Reduced the cutback from 56% to 50%
Holding compensation for agricultures	Minister of Finance	Implementation of water cutback and increase in tariffs in agriculture	2000	Enabled 7% increase in water tariff
Stressing the importance of the red-lines	Environmental organizations, academic community	Protection of water levels	1999–2001	Failed to protect the water levels
Cutbacks by emergency decree	Water commissioner	Reduce cutbacks in all sectors	1999	Enabled cutbacks

Table 3
Representation of Sectors in the Institutions Affecting the Water Allocation

Institutions Affecting Water Allocation to Agriculture	Sectors Represented in Institution			
	Agriculture	Environment	Tourism	Professional
Water Council	Yes	No	No	No
Operation Committee	Yes	No	No	Yes
Ministry of Agriculture	Yes	No	No	—
Water commission	Yes (if commissioner is from the agricultural sector)	No	No	Yes
Cabinet and cabinet committees	Yes	Yes	Yes	No
Prime minister	Yes (if the prime minister is from the agricultural sector)	No	No	No

ineffectiveness of the red-lines as an administrative means for protecting water resources.

Attempts to address a water shortage by reducing domestic and industrial water consumption require cabinet approval, which, except for one occasion in 1999, has never been granted. The option available to the water commissioner for reducing water allocations to Jordan and the Palestinian Authority is also highly restricted. Specific commitments regarding the sharing of water are designated in the peace treaties signed between Israeli and the Palestinian and Jordanian governments. Moreover, many bodies, including the Ministry of Foreign Affairs and the Prime Minister's Office, are likely to oppose such a policy.

The result of the agricultural sector's many checks to halt water cutbacks and the lack of balances to ensure that the tools are equally distributed so that all legitimate players are adequately represented is often a policy of overexploitation.

Agriculture's Positive Externalities

The success of the administrative division and the differential checks available to block a major water cutback in the agricultural sector was often supported by bringing the positive externalities of agricultural activities into the foreground of policy debates. Table 4 describes these externalities and the forums in which they were raised during the drought period explored here. The decision makers took these externalities into consideration when discussing water reductions for agriculture. This was the case in the winter of 1999 when Commissioner Ben Meir issued an emergency decree to spread the burden of the cutbacks over all sectors so that not only the farmers were hurt. It was also the case in 2000 when Prime Minister Sharon rejected rationing beyond 50%, citing the positive externalities of agriculture activities.

In order to examine whether the members of the discourse group involved in the allocation process differed among themselves in the types of positive externalities they promote in the allocation discourse, the study surveyed around 150 newspaper articles and primary sources that addressed the positive externalities of agriculture, for the period of the drought, and identified in each article the type of externalities upon which each group focused. Figure 4 shows the positive externalities prioritized for each discourse group. Each column in Figure 4 represents the share of the various types of externalities prioritized by the different groups as a percentage of the total number of articles surveyed. It indicates that the positive externality

Table 4
The Types of Positive Externalities of Agriculture and the Forums in Which They Were Raised

Type of Externality	Positive Externality of Agriculture	Forum Raised
Economic	Economic livelihood in areas with little employment	Parliament and its committees, press, Water Council, appeal to the Supreme Court
Security	Safeguarding the Jewish land	Parliament and its committees, press, appeal to the Supreme Court
	Protecting the borders	Parliament and its committee, press, appeal to the Supreme Court
	Food security	Parliament and its committees, press, appeal to the Supreme Court
	Population dispersal	Parliament and its committees, press, Water Council, appeal to the Supreme Court
Zionist	Contributes to the Zionist ethos	Press, appeal to the Supreme High Court
Environmental	Use of urban waste water	Parliament and its committees, press, Water Council
	Safeguarding open spaces	Parliament and its committees, press, Water Council appeal to the Supreme Court
	Desertification prevention	Parliament and its committees, press, appeal to the Supreme Court
	Water buffer for dry years	Parliament and its committees, press
Minority rights	Employment for Arab minorities	Press

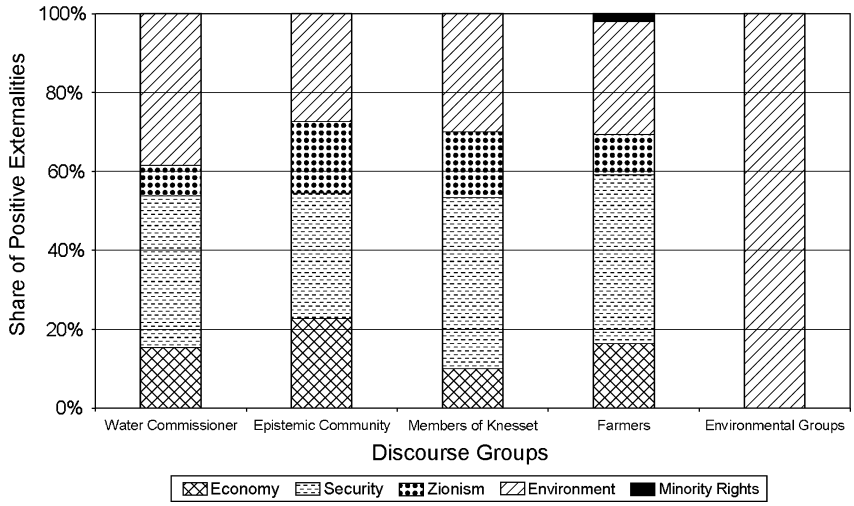

Figure 4. The distribution of positive externalities between the different discourse groups (number of articles surveyed for each discourse group = 100%).

that received the greatest emphasis was the contribution of agriculture to national security. Securitizing agricultural activities and highlighting their positive effects even in times of conflict allow many adverse implications to be swept aside. This argument was stressed by all groups involved in the water allocations except the environmental groups. The contribution of agriculture to the environment was also often stressed by the agriculture spokespeople. Figure 4 also shows how the alleged contribution of agriculture to the national economy received scant attention during the drought. This may be explained by the diminishing contribution of agriculture to the state's gross domestic product (GDP) (less than 2% of total GDP).

Lessons and Implications

There is a widespread agreement that higher degrees of integration allow for more optimal water management. It is also assumed that IWRM can alleviate water poverty and contribute to achieving the Millennium Development Goals. Lack of IWRM, it is assumed, is characterized by fragmented water systems dominated by the strong and inflexible water rights, which results in unsustainable and inequitable water policy. Indeed, many places in which water systems yield suboptimal results are now engaged in attempts to implement IWRM, including developing an adjustable allocation system (often in the form of water trading). Against these assumptions stand the limited practical experience with IWRM and some early warnings that IWRM is likely to produce some undesired and even detrimental outcomes (Shah and Van Koppen 2006; Kindler 2000). To examine why IWRM may fail to deliver its expected outcomes, the Israeli system was examined, a system that is characterized by a high degree of integration that also includes an allocation process that can be adjusted in the face of droughts.

The Israeli case study indicates that despite the high degree of integration in its water sector, the system failed to protect its water resources, as was clearly seen in the drought events of 1999 to 2002. The analysis of decision making during the drought of 1999 to 2002 reveals that water in Israel is governed by a political process in which private interests, power considerations, and a representative government set the allocation of the resource. These agents often include in the allocation process factors outside strictly professional water management considerations. However, the problem is not the politicization of the water system since water allocation is inherently a value-laden judgment. Rather, the problem is with the lack of what John Dryzek (1989) calls "policy science" that is based upon both democracy and rationality in the allocation policy. The lack of democracy is due to the fact that not all groups affected by the allocation process are represented. The lack of rationality is because the cost of overexploitation to the general public outweighs the local short-term benefits for some privileged groups.

It is the institutional structure of the water system in Israel that tends to ignore policy science at the expense of rationality and democracy. It was both the differential checks (with no balances) implicitly instituted in the process and the administrative division of the water system that empowered agricultural interest groups while eroding the ability of other groups to influence that same process. This institutional structure has created a situation of unbalanced institutional integration and politics: in not granting all those affected by the allocation process equal opportunity to influence water allocations, it prevents an objective evaluation of the benefits of agricultural activities against their cost to other sectors. The many assumptions concerning the positive externalities of agriculture further block the ability to conduct this cost/benefit evaluation. It is important to note that the validity and extent of many of the positive externalities attributed to agriculture have never been tested empirically.

Many of the detrimental implications of the Israeli water policy could have been avoided had the physical

integration of the water system been coupled with a balanced institutional integration. This discrepancy between the physical and the balanced institutional integration empowered agricultural interest groups in the south to exploit water resources in the north (Lake Kinneret), while not establishing mechanisms to counter their rent-seeking behavior. The unwelcome and unsustainable outcome of this unbalanced institutional integration triggered the establishment of a new Water Authority with a wider range of responsibilities and representation. To better reflect a system with checks and balances, the new authority now includes an oversight committee that is composed of representatives of six sectors that are affected by the authority's actions.

The results of this study teach us that successful implementation of IWRM should be considered an exercise in social problem solving and not only a technological or a physical issue. Thus, researchers and practitioners need to understand how collaborative processes may be applied to the implementation of IWRM. An administrative division that is deliberately used to halt any collaborative processes that come to adjust the allocation should be avoided. This implies that while reforming the water sector along the IWRM lines, measures must be taken to ensure that physical integration coincides with an institutional integration—otherwise the results may be worse than if there were no integration at all. Effective institutional integration that allows adjusting allocations in the face of unforeseen events requires having one single entity or collaboration between entities to address all aspects of water. Considering all elements of the hydrological cycle concurrently will allow trade-offs to be weighed concerning the quantity, quality, and pricing of water. Effective integration also requires checks and balances in the decision-making process of water allocation. Checks are necessary to ensure that there are tools available for players to affect the allocation process and balances to ensure that the tools are distributed equally so that all legitimate players are represented. Unless these institutional conditions are met, even a system based on IWRM elements is not likely to be able to absorb climate fluctuations in a sustainable manner.

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