

Global Issues in Water Policy 4

Nir Becker *Editor*

Water Policy in Israel

Context, Issues and Options

 Springer

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GLOBAL ISSUES IN WATER POLICY

VOLUME 4

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This book is dedicated to the memory of late Professor Dan Yaron: a teacher, mentor, and a friend, but most of all, a true gentleman and one of the most sensitive individuals I have ever met. His knowledge and modesty serve as a permanent light to my path. Dan introduced me to the complex issues of water policy in Israel; it is only a small thanks compared to what is due that I dedicate this book to his memory.

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Chapter 1

Introduction

Nir Becker

Taking into account the range of issues, the number of alternative management strategies, the complex structure of governing institutions and the unavoidable interplay between values, interests and power, it has been argued that public policy processes are anything but linear, organized or coherent arenas (Teschner et al. 2012).

This book aims to focus on the policy of the water sector in Israel. It brings together 16 chapters written by experts in their field. Each chapter deals with a different aspect of the policy dimension. In this introduction chapter, I draw the linkage among them besides providing the justification for this book and describing the water sector in Israel in a concise way.

It should be noted that there is no chapter about water policy in Israel, per se. The topic is complex enough that it cannot be dealt with within a single chapter. Water policy refers to the aspects of the water sector with which the government deals. These may include supply and demand management, pricing, water conflict resolutions, and the international water policy dimension. It is important to remember that policy does not define actions so much as it defines the rules. The implementation of these rules is later implemented in Israel by what is called the “master plan.”

Water policy in Israel changed over time as a result of two major forces (Alatout 2008). On one side, this is not a good indication since policy needs to address changing conditions. On the other, it demonstrates the flexibility that one can observe in cases where significant changes in some exogenous conditions have occurred. Was this really the case in Israel? Several committees formed by the government, the parliament, and the state comptroller have indicated that the first force dominated the second (Magen Committee 2002; Milgrom and Schwartz 2008; Bain Committee 2010). These committees plus some internal ones under the Water Authority were abundant (19 according to Fischandler 2008). But these committees

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are looking backward, while policy needs to look forward and, as such, always faces some uncertainty (Tal 2006). Thus, a good or bad outcome is not necessarily correlated with a good or bad policy (Fischandler and Heikilla 2010). The situation is more complex and hence deserves a special attention. This is a major reason for the appearance of this book.

This is the first chapter in this book and it is divided into three parts. The first one describes some basic statistics and estimates regarding the water sector in Israel. The interested reader can find parts of those estimates in chapters along the book, but it might be useful for the reader to get a fuller picture. The second part deals with the policy questions the water sector in Israel faces and why it is a unique experience as well as a challenging one. The third part briefly describes the different chapters and relates them into the policy aspects that need to be addressed.

1.1 General Background on the Water Sector in Israel¹

Israel currently has renewable freshwater available sources of some 1,300–1,400 million cubic meters (MCM) annually, representing a per capita supply of some 180 m³ of water annually. The current annual consumption of water is about 2,100 MCM. This represents per capita consumption of 268 m³. The definition of the UN for water scarcity is less than 500 m³ water per capita annually.²

1.1.1 Supply Sources

Israel's main natural renewable sources of water supply include the Sea of Galilee (Lake Kinneret) and Jordan basin springs and rivers, the Mountain Aquifer, and the Coastal Aquifer. Several smaller aquifers constitute the rest of the natural supply. Figure 1.1 below presents the distribution of water natural sources. Figures on the chart are in MCM and percentage from the total of 1,392 MCM of renewable supply sources. A general insight into the water system in Israel is given in Map 1.1.

As can be seen from Figure 1.1 and Map 1.1 below, almost all the water resources are based on three major sources: two groundwater aquifers and one lake. It can be also noted that they are connected by what is called the National Water Carrier (NWC). The importance of each one of these resources is crucial for policy

¹An up-to-date overview of the water sector in Israel can be found in Kislev (2011). A more general overview, less technical but more detailed, is given in Gvirtzman (2002). Figures here are based on Waslekar (2011).

²When annual water supplies drop below 1,000 m³ per person, the population faces water scarcity, and below 500 m³ “absolute scarcity.” Source: website page of UNDESA (United Nations Department of Economic and Social Affairs)

<http://www.un.org/waterforlifedecade/scarcity.shtml>

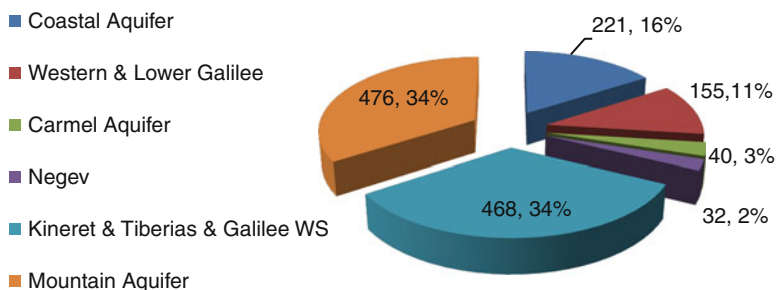


Fig. 1.1 Distribution of water resources in Israel – 2010 (in MCM and %)

purposes. The Sea of Galilee and the coastal aquifers are subject to pollution, and the Sea of Galilee also serves as a recreational site. The Mountain Aquifer is a resource in dispute between Israel and the Palestinian Authority (PA).

1.1.2 Demand³

The demand for water in Israel originates from three major sectors – agricultural, industrial, and domestic use (households). A fourth sector is becoming more and more relevant in the last few years, water for nature in the form of in-stream flow into the different rivers. Total consumption in 2010 was 2,013 MCM, while some 100 MCM were allocated to Jordan and the PA. Figure 1.2 below presents the distribution of water consumption by the different sectors.

Worth mentioning is the fact that most of the water allocated to agriculture is reclaimed and treated water, and in general, no more than 500 MCM of freshwater are allocated to agriculture. This was a result of a major change in Israel’s water policy to be discussed in several chapters along this book.

1.1.3 The Gap Between Supply and Demand

Figure 1.3 below represents the trend of water consumption vs. water availability in the last 30 years. As can be seen from this figure, the utilization rate has increased from 108% in 1980 to some 150% in 2010. This utilization rate was possible due to the use of marginal water, mainly treated wastewater and desalinated water. Projections indicate that the demand will increase to 2,500 MCM in 2020 and close

³Data are taken from water authority website – <http://www.water.gov.il/Hebrew/ProfessionalInfoAndData/Allocation-Consumption-and-production/20091/by-goals.pdf>



Map 1.1 Israel's water system (Source: Feitelson and Korenthal 2012)

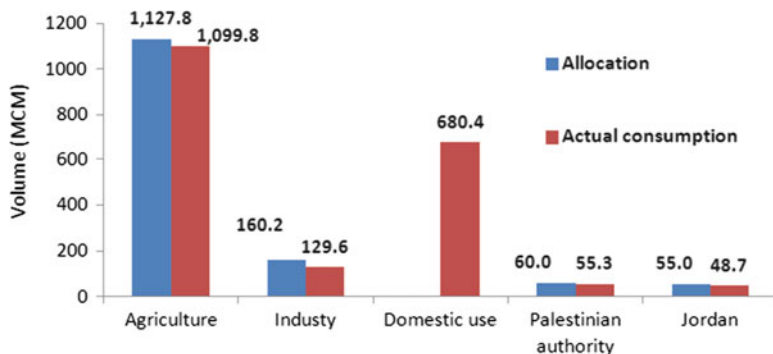


Fig. 1.2 Major beneficiaries of water consumption in Israel (in MCM) – 2010

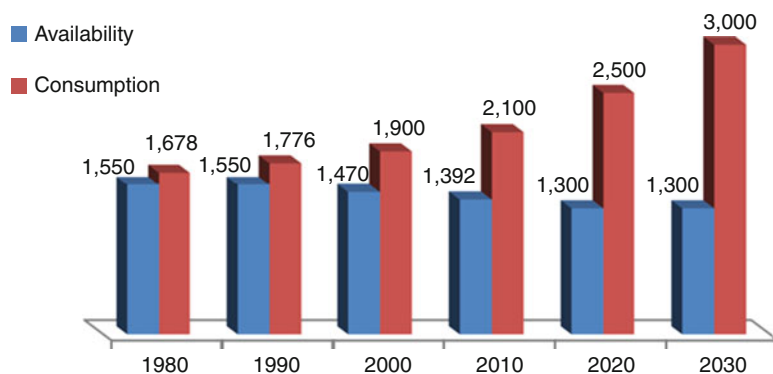


Fig. 1.3 Water consumption vs. availability

to 3,000 MCM in 2030, while supply of available freshwater will slightly shrink, resulting in a utilization rate of almost 200% in 2020 and more than 230% in 2030. This trend is what consist the “water crises” in Israel.

1.1.4 Marginal Water

As seen in Fig. 1.3, the gap between supply and demand for water is increasing over time. In order to reduce the gap, Israel’s major policy goal was to increase the supply available, on one hand, and to reduce demand on the other.

From the supply side, Israel has increased its use in marginal water, including using means of desalination, wastewater treatment, and water harvesting. Each is indicated below:

Desalination – n 2011, 296 MCM of water were desalinated out of sea water, and some 45 MCM were desalinated out of brackish water. There are currently three active desalination plants, working in reverse osmosis technique – in Palmachim,

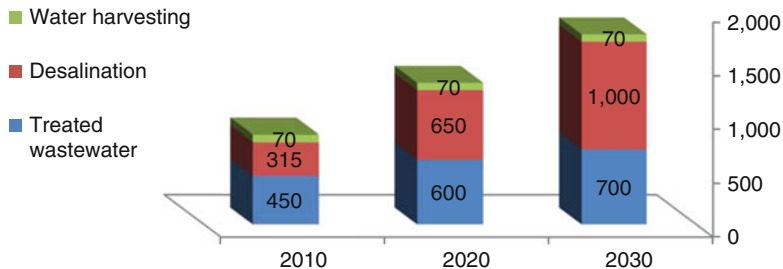


Fig. 1.4 Current and future marginal water use

Ashkelon, and Hadera, producing 46, 120, and 127 MCM, respectively. Few other plants are in construction, designated to increase annual desalination capacity to 700 MCM by 2020 and then an additional 100 MCM every 4 years.

Treated wastewater – Israel is one of the leading countries in the world in managing (treated and reclaimed) wastewater. In 2007, 92% of the wastewater in Israel was treated, and over 75% was going to be reused in irrigation. Currently, some 450 MCM of wastewater are reclaimed for agriculture, and this figure was supposed to increase to 600 and 700 MCM in 2020 and 2030, respectively.

Water harvesting – The current estimate is about 70 MCM. Water harvesting generally includes capturing runoff from rooftops and local catchments, capturing seasonal floodwaters from local streams, and conserving water through watershed management.

Figure 1.4 above presents the current and projected volume of marginal water supply.

As can be seen from Figs. 1.3 and 1.4 above, the increase in marginal water supply corresponds to the increase in the gap between the supply and the demand of renewable freshwater. Seemingly, it should be enough. However, this change in water mixture did not come without a fight, and, moreover, it was recently found that climate change can add more pressure on the already semiarid climate of Israel (Alpert et al. 2008). The Water Authority is trying to close the potential gap by treating the demand side as well (Lavee et al. 2011). This was done by several methods to be explored in this book. They include both changes in the water tariffs as well as non-price measures.

The gap between supply and demand is one of the main concerns for water policy makers in Israel. But it is necessary to view water policy as a broader sense than this gap alone – hence the need for this book.

1.2 The Need for Water Policy

The need for water policy is not restricted to Israel, of course. Every country deals with water problems by initiating its own policy on the subject. Why is a special book needed about Israel’s water policy? There are several reasons which I can

think of. The first is that no such book was written in such a comprehensive effort by many leaders in their field. Second, it provides up-to-date information while not neglecting the past events that have led to the current situation. But the most important reason is that Israel can serve as an example to a country that has to deal with so many aspects of its water sector that it can be a good starting point for other countries that face part of the problems that Israel is facing by learning how to cope with these issues from past experience.

Not all the water sector issues are unique to Israel of course, but it is the sum of all those aspects that makes Israel a unique case study. Here are some of issues that together make Israel's water sector issues unique:

- *Mixture of private and public aspects:* Water is consumed by households, farmers, and industry; however, it also carries public good characteristics by providing high elevation in the Sea of Galilee, in-stream flow in rivers, and by creation of desirable landscape arising by farming. Those last values do not carry a price tag, but certainly have a value associated with them. How can this be reconciled by the free market? It cannot and therefore there is a role for a policy.
- *Water as a social good:* Despite the fact that water can be thought of as a commodity (either private or public), it can also be served as a tool to achieve social goals that cannot be quantified. Those goals have no direct value attached to them, but rather serve as constraints. Examples of such are water diverted to the periphery to sustain living conditions to settlers, water to farmers in a minimum amount to sustain heritage, and water as a basic good that every person has the right to get a minimum amount regardless he/she can afford it or not. All those elements of water do not have a direct value, but they have an indirect value. This indirect value can be defined as the opportunity cost of achieving those preset goals. Water policy should take those costs into account when defining such goals.
- *Common property resource problem(CPR):* The main water sources in Israel (there are 3 such sources) can be characterized as CPRs. In such resources, there exists the quazi-public good problem. Hence, the consumption of the good is private (You get what you pumped), but the cost of the extraction and the quality of the resource are both determined by the action of all users involved. In such situation, there is a market failure known as the tragedy of the commons. Without some governmental policy, there would be inefficiency involved which may result not only in higher extraction costs but also in morbidity and mortality due to increased pollution which is not regulated.
- *Increasing return to scale:* Most of the water resources extraction and diversion as well as distribution are associated with large infrastructure facilities. In a nonregulated market, this may result in too many firms operating with high upfront costs. Therefore, natural monopoly is the common way of water activities that we may find. However, without public regulation, a natural monopoly will act as a regular monopoly, thus creating a deadweight loss.
- *Shift in demand and supply:* Changes in both demand and supply have been happening very fast in Israel during the last two decades. On the demand side, we can observe a large increase in the urban population and standard of living.

We also observe a change in preferences which results in more weight given to water that serves nature conservation. On the supply side, we observe a downward slide in the precipitation level annually. Since precipitation is the major water supply source, the gap between demand and supply increases dramatically from both ends. While in a regular market this is not a cause of worry (from a policy point of view) since the price rise will adjust accordingly, this is not the case here. The market is regulated hence price does not necessarily reflect scarcity, and as such, policy makers should decide what is best to do. Augment supply and how or reduce demand and how? A good policy formation should not be changed according to those shifts but rather set up a known in advance rules that will allow the regulators to act accordingly.

- *Uncertainty*: Water can be thought of as a flow variable, but also as stock. The three main water sources in Israel are being used as buffers. As such they can be used to smooth fluctuations in supply to serve a constant demand as much as possible. However, depleting stock does not come without a cost and might be thought of as going on the verge. A good policy should form some well-defined rules that can associate extra use of water with the cost of doing so.
- *The international dimension*: A significant amount of water that Israel uses originates in disputed areas. Israel is not an isolated island, and considering water policy which does not take into account Israel's neighbors is not serving the overall assessment of efficiency, equity, and justice. The Hashemite Jordanian Kingdom and the Palestinian Authority are striving for water and are having even a stressful water conditions than Israel. Part of Israel's water resources are shared with those neighboring entities, and it is expected that more will be given up when peace process will be more dominant in the region. Internal policy needs to take those factors into account in its overall assessment.

These points are only a partial list of policy questions in Israel which need be addressed. Since the policy instruments may be diverse but not as many as the policy issues, as such they cannot fulfill all goals in a perfect way. But they can give an answer which can be thought of as the best policy considered all things that need to be taken into account. As long as the policy is spelled out openly and is based on a solid and scientific ground, it can be defined as a successful one. Based on the previous list of issues and the instruments that are available (water pricing, standards, public-private sectors relationships, etc.), is it possible to achieve a successful water policy in Israel? I hope that after reading this book, a better understanding of the topic will be at hand.

1.3 Structure of the Book

This book is composed of 18 chapters. Besides this chapter and the last one, which summarizes the book, the remaining 16 chapters were assembled to make a logical sequence of reasoning.

Feitelson (Chap. 2) examines the history of water policy and divides it into several different eras. The first shift occurred in the early 1960s, when the emphasis shifted from development and access to allocation. The second shift was toward greater sensitivity to water quality issues. Since the late 1980s, the Israeli water sector has moved toward more economic rationing of water, and this was followed by the current era which contains large-scale desalination on the Mediterranean coast as well as wastewater reuse. The chapter will describe the external and internal forces that drove the country from one era to another.

Menahem and Gilad (Chap. 3) concentrate on the reasoning which explains policy stalemate for long periods, especially in situations where the risks generated by prolonged policy impasse are obvious. This chapter attempts to explain the stalemate in Israel's water policy during the two decades between 1980 and 2000, a stalemate that persisted despite a general consensus on the gravity of the status quo, the inadequacy of existing policy, and the risks of the continuing impasse. The chapter also tries to identify the factors that account for policy changes in the 2000s. It addresses questions regarding both policy impasse and policy change and analyzes them using two joint theoretical frameworks, namely, the Advocacy Coalition Framework (ACF) and the constructivist Narrative Policy Analysis (NPA).

The next two chapters contain policy issues that relate to two important sectors, namely, agriculture and nature. The reason is that the agricultural sector was the largest water consumer for many years and was accused of being a major cause of the water crises, by significantly increasing the price gap between supply and demand. Water for nature, on the contrary, was not given much attention until about 15 years ago. However, in the last period, it was identified as a major driver for public preferences change. Kislev (Chap. 4) surveys recent developments in the use of water in agriculture and related policy issues. Among the topics covered are the shifts from freshwater to recycled effluent, the water and food balance of the country, and growth of water productivity and its explanation, allocation, and price policy. Katz and Tal (Chap. 5) take a closer look on the water as a source for nature conservation. They claim that by the 1960s, the intermittent streams that crisscrossed the country, emptying either into the Mediterranean or into the Dead Sea, were little more than a putrid system of sewage conduits, with the local aquatic habitat decimated or changed beyond recognition. Yet, during the past two decades, initial signs appeared that suggest that this ecological misfortune might be reversible. Recent advances in the construction of Israel's desalination infrastructure, however, have added substantial quantities of freshwater to Israel's national grid and have raised the prospects for a new deal for Israel's streams. Questions as to who shall pay for rehabilitation, what level of clean up is acceptable, and what the in-stream standards and uses that should drive restoration efforts ought to be remain unanswered. The chapter traces the different stages in Israel's efforts to bring its streams back to life, maps the different positions of stakeholders, and offers a strategy for future restoration efforts.

Chapters 6 and 7 deal with the two most significant water supply augmentation sources, namely, waste water reuse and desalination. Lavee and Ash (Chap. 6) explore the issue of reusing domestic sewage production. Such a source can

substitute conventional water used for irrigation. The chapter addresses the trends and changes that took place in Israel's wastewater management, in the treatment quality, and in the politics of reusing water for different purposes. It offers a view of the sectors that initiate demand for this kind of water and examines how the question of water quality can influence the future trends and users of water reuse in Israel. The chapter outlines the economic benefits of wastewater reuse and the place of Israel's "WaTech" both locally and globally. Spiritos and Lipchin (Chap. 7) conduct a comprehensive assessment of the impact of desalination in Israel. The chapter includes a comprehensive assessment, including an evaluation of the social, economic, and environmental impacts of current and planned desalination activities in the region. Specifically, they identify in what ways the proliferation of water desalination technology may affect a water-scarce country and region given its growing demand for water, assess the environmental impacts of desalination technologies on a region that is already under severe anthropogenic stress, and determine the political, governmental, and economic ramifications of the potentially plentiful water that desalination may provide. They also present the social costs and benefits of desalination for Israel in particular, and for the region in general, with specific attention directed at contrasting socioeconomic contexts that exist across the region in particular and explore and propose institutional policy and legal arrangements for addressing the environmental and social impacts that may be associated with expanded desalination.

In the next chapter, Furman and Abbo (Chap. 8) look at groundwater management in Israel. Since groundwater is (still) the main source for Israel's water supply system and its main long-term water storage, it can serve as a better understanding of Chaps. 6 and 7 in retrospect (Feitelson 2005). Furthermore, Israel uses the groundwater system as part of its wastewater treatment system, uses it for limited flood water storage, and more. Thus, both quantity and quality issues are important in that sense. The chapter starts with an overview of the aquifer system and the way the different aquifers relate to the national water supply system. The recent history of the major aquifers is then reviewed, and different processes are identified. Unique usages of the aquifer system are also discussed in detail, focusing on the role of aquifer systems in a dry region country. Last, operational management practices are discussed both in terms of quantity and of quality.

Chapters 9 and 10 deal with the economic approach taken toward dealing with water allocation and issues. DiSegni (Chap. 9) deals with price mechanisms and their application within the Israeli water sector. The chapter outlines the long-run profile of market-based regulations that have been adopted by Israel over the years. These regulations were implemented in an attempt to cope with water scarcity on one hand and with the increase in water demand on the other. Particular attention is given to the relative efficiency of applying pricing mechanisms and quotas to regulate use in the agricultural sector, a dominant user of water resources. The chapter also discusses the consequences of these market regulations on the development of water-saving technologies in the agricultural and industrial sector and the development and penetration of alternative water resources, such as saline water, desalinated water, and effluents that are used predominantly in the

agricultural sector. Katz (Chap. 10), on the other hand, concentrates on non-price instruments in order to regulate the water sector. For many reasons, water is not priced as an ordinary commodity. In Israel, the government regulates water pricing, and so changes to water prices often entail long hard-fought political battles. As such, the current pricing mechanisms are often unable to address many water demand issues, such as quick responses to drought. Instead, a variety of non-price mechanisms have been utilized to complement pricing policies. These include, *inter alia*, quotas, educational and informational campaigns, and government buyback of water rights. Such non-pricing mechanisms often avoid many of the political hurdles that price increases face, and are thus easier to implement. This chapter briefly reviews the water pricing policy in Israel and the political obstacles that price reform has encountered over the recent past. The chapter also presents a description and analysis of the non-pricing mechanisms that have been utilized in the past.

Chapters 11 and 12 deal with two significant water resource bodies that hold specific and important roles in Israel's perspective of water resource management. These two water resources are the Sea of Galilee and the Dead Sea. The Sea of Galilee is one of the three major water supply sources in Israel and the only one which is not a groundwater source. As such, it holds many conflicts in its management since it serves as both water source as well as an ecological and recreational one. Managing the lake with these two (possible) conflicting goals is one of the most challenging issues. Parparov, Gal, and Markel (Chap. 11) claim that quantifying water quality and its incorporation into a management objective function is a major step in the establishment of natural-water, resources management policy. They show how a quantified system can be integrated into a methodological framework, developed for the management of the unique social-ecological ecosystem of the Sea of Galilee.

The Dead Sea is not a water supply source but rather a terminal lake. Its value is totally derived from recreation and heritage. However, since it is located downstream the Jordan River, it was considered last in line with respect to priorities causing its level to decrease by about 1 m annually. One of the more ambitious projects that is being considered is the Red-Dead Canal that aims at bringing water from the Red Sea in the south, up north to the Dead Sea. Markel, Alster and Beyth (Chap. 12) discuss the relevant options: one is to let the sea reach a new equilibrium. Another one is to release water from the Jordan River to feed the Dead Sea again. That means releasing water to flow again through the Jordan River instead of being diverted through the "national carrier." The last solution suggested is to divert water from the Red Sea in the south in what is called the Red-Dead conduit. This last option will raise the Dead Sea level by desalinating sea water, primarily for use by Jordan and the Palestinian Authority. The chapter presents an overview of the Dead Sea problems and its possible solutions and concentrates on the advantages and disadvantages of each of the three alternatives listed above.

The next four chapters deal with two kinds of uncertainty. The first two chapters deal with climate change and its effect on the Israeli water sector. The next two chapters deal with the international dimension of Israel's water policy.

Climate change and its impacts are summarized in Chaps. 13 and 14. Kan and Zeitoni (Chap. 13) explore the effects of varying annual rainfall patterns on the profitability of winter crop production in Israel. Rainfall distribution functions, and yield-water response functions, are used for simulating regional net-benefit expectations under a future projected scenario of changes in precipitation patterns. Simulations indicate a future decline in net-benefits relative to those in the latter part of the twentieth century. Although most of the effects are seen in the semiarid southern region, some reduced profitability is detected in the Center and in the North of the country. One of their conclusions is that risks for annual economic losses increase because of the larger variability in rainfall events. Issar and Livshitz (Chap. 14) deal with two kinds of uncertainties which Israel may face due to climate change. The first deals with temperature uncertainty and the second with energy sources. It is predicted that the ongoing global warming will cause a reduction in precipitation in the Mediterranean region, including in Israel. Yet lately, this prediction is faced by a big question mark, as a new factor may act in the opposite direction of global warming. According to scientists at the National Solar Observatory (NSO) and the Air Force Research Laboratory of the USA, the number of sunspots is forecast to decline to a minimum. This may cause a cooling of our planet. Which of the two factors will emerge? Another uncertainty factor deals with the sources of energy needed to desalinate sea water. Currently and in the planned future, desalination plants receive energy from power stations and burning fossil fuels, thus producing greenhouse gases. In order to ensure Israel's safe supply of water in the face of these and other types of uncertainties explored in the chapter, the authors suggest creating groundwater storages capable of supplying, at least for a few years, about 50% of the domestic water supply.

Chapters 15 and 16 deal with the international dimension of water policy in Israel. While Chap. 15 deals specifically with a microlevel river basin analysis, Chap. 16 takes a more general picture and looks at the overall context of water issues, mainly conflicts but also resolutions between Israel and its neighbors. Laster and Livney (Chap. 15) depart from the lack of a comprehensive peace plan to resolve the Israeli/Palestinian conflict in the near future. In the chapter, they suggest that preparation of a master plan for a trans-boundary watercourse can serve as a touchstone for cooperation between two conflicting entities. It enables decision making under any scenario: coexistence, cooperation, or partnership. It weighs the value of each scenario and allows policy makers to make decisions based on value judgments. It improves tools for grass-roots democracy, stakeholder involvement, and collaborative decision making. In the worse case, it serves as a platform for discussion instead of acrimony and in the best case, a platform for river restoration, improved planning, and biological diversity. Shmueli and Aviram (Chap. 16) assume that the allocation of the water resources of the Jordan River Basin and the Mountain Aquifer of the West Bank and Israel are key issues in any lasting settlement of the Arab-Israeli conflict. Over the past decade and a half, two agreements have been negotiated. The first is addressed in the October 1994 Israel-Jordan Peace Treaty. The second was incorporated within the September 1995 Oslo II Interim Agreement between Israel and the Palestinian Authority. This chapter reviews these

accords, relating them to international standards of water quality and waste water agreements, considering the feasibility of water imports, and assessing the regional political implications of water allocation proposals in peace negotiations.

Feinerman, Frenkel, and Shani (Chap. 17) deal with the reaction of the Water Authority to the issues mentioned above. The Water Authority was established in 2007. Until that year, water management in Israel was divided among seven governmental ministries, hampering efficient management, planning and development. The Water Authority serves as an executive arm, and the Council functions as the legislative arm for Israel's water economy. Both arms are responsible for the management and regulation of the water sector, in accordance with governmental policy. The Authority was established in the midst of a severe water crisis which forced it to devote a substantial amount of time and resources to develop short-term supply and demand mitigation policies. However, the Authority did manage to enter the process of implementing a series of far reaching reforms, including the following: (1) achieving governmental approval for a significant increase in supply via the development of large-scale seawater desalination plants (750 MCM until 2020) and hastening its construction processes, (2) reducing demand via a significant increase in nonagricultural water charges (by an average of 40%) that comply with the law requiring full cost recovery and restructuring water tariffs that distinguish between a basic rate for water and a rate for high consumption, and (3) shifting urban water provision from the control of municipal authorities to the control of local water corporations. This chapter is aimed at analyzing the economic and social motivations for the above significant reforms and evaluating the impacts of the intervention of members of parliament and of various consumers' interest groups in the decision making process. It points out the advantages and disadvantages of each one of the major decisions and offers a vision for the future design of supply-side and demand-side management schemes in the Israeli water economy.

Finally, Becker (Chap. 18) concludes this book by providing an interpretative summary and synthesis of the previous chapters, as well as by identification of a more specific research and policy agenda for Israeli water sector.

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Chapter 2

The Four Eras of Israeli Water Policies

Eran Feitelson

Israel is considered by many as a paragon of sound water management (e.g., Postal 1997). Due to the severe water scarcity Israel faces and the relatively high levels of human and social capital it can muster, Israel has successfully implemented policies that are at the forefront of the water policy field. These policies enabled Israel to develop an advanced postindustrial economy and to supply a burgeoning population with high-quality water at the tap on the basis of scarce and contested water resources. Moreover, Israel has succeeded in providing water to an advanced agricultural sector whose product per unit of water has risen rapidly in the past 30 years.

Yet, the seemingly successful water policies have been criticized within Israel as being outdated, inefficient, and environmentally detrimental. In the past 15 years, there have been increasing calls for an overhaul of Israel's water policies, as can be seen in the formation and recommendations of a series of governmental and parliamentary inquiry commissions.¹ These calls, coupled with the new options opened by large-scale desalination and the shifting intra-Israeli power structures, suggest that such a structural change may be underway (Feitelson and Rosenthal 2012).

Two of Israel's main water sources are shared (see Fig. 2.1). Consequently, Israel has been embroiled in some of the most widely discussed international water conflicts in the world. Actually, it is safe to suggest that the number of words written about water in the Israeli–Arab context, per unit of water, is significantly higher than for any other water conflict. Most of the studies on the Middle East water

¹Invariably named after their chairs, these are the Arlosoroff committee (1997), the Magen committee (2002), the Gronau committee (2005), and the Bein committee (2010).

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Fig. 2.1 The Water resources of Israel and the NWC (Source: Author)

conflicts analyze Israel as a unitary player. Yet, as many studies of international affairs suggest, foreign policy is often driven by domestic concerns. Thus, most negotiations are conducted concurrently between countries and within countries (Putnam 1988). However, the internal mechanizations of Israeli water policies have remained largely opaque for the international audience. Hence, this chapter focuses on the shifts in Israeli water policies from an intra-Israeli perspective, though it does note the interplay between intra-Israeli policies and the international scene.

Israel lies between the Mediterranean and arid climatic zones. Rainfall ranges from 1,000 mm/year in a small part of the north to 100 mm/year and less in the southern half of the country, most of it within 5 months (November–March). As a result water has historically been a critical aspect of human habitat. However, until the technological innovations that were introduced in the late nineteenth century, most of the human habitation was based on springs, wells, and cisterns. At the time Israel gained independence, in 1948, water resource development was still largely limited to local and regional systems (Feitelson and Fischhendler 2009; Seltzer 2011). At that time only 20,000 ha were irrigated, and municipal systems barely supplied the domestic demand, which was low by today's standards (Weiner 1993).

The history of Israel's water policies since independence can be divided into four eras, differentiated by the issues, goals, discourse, means, and actors that framed the policies. A systemic shift in all these parameters occurred between each period and the subsequent one. Hence, the history of the Israeli water sector can be told as a story of eras and the transformations between them. The purpose of this chapter is to outline these four eras and the factors that led to the restructuring of the water policies from one era to the next.

Each era is described according to the main concerns that drove policies, the main actors that affected those policies, and the main issues that arose, and ultimately led to the next transformation. Clearly, transformations take time and cannot be seen as clean breaks from the past. Hence, while the periods can be delineated time-wise, there are overlaps between them.

2.1 The First Era: The Hydraulic Mission Period (1948–1964)

Immediately after independence, Israel was faced with three critical concerns: One, to accommodate the large immigration wave over one million new immigrants within 3 years; two, to provide food for the burgeoning population, as much of the previous production potential was damaged in the war and imports from neighboring countries were cut off; and three, to establish control over all the area of the state and prevent a return to the 1947 UN partition lines. Agricultural settlement was seen as the primary mean to address all three concerns, as it allowed immigrants to move quickly into the labor force, thereby increasing domestic food production at a time the country faced food and capital shortages, while establishing a stable presence in the contested areas (Bein 1982; Reichman 1990).