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Managing the Waters Within Area A: Water Allocation in Jericho as a Case Study for Palestinian Water Management

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Managing the Waters Within Area A: Water Allocation in Jericho as a Case Study for Palestinian Water Management

by

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Dedication

This thesis is dedicated to Bubbie who told us to keep writing.

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Abstract

Managing the Waters Within Area A: Water Allocation in Jericho as a Case Study for Palestinian Water Management

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This thesis examines the case study of Jericho as an example of the unique challenges of intra-Palestinian water allocation. Over the past hundred years, Jericho has been under the control of five ruling governments: Ottoman, British, Jordanian, Israeli and Palestinian. This study begins with an investigation of local water allocation under foreign control. Throughout each period of rule, legislation about water was inherently connected with land control, and Jericho's history as an agricultural city dictated how water was classified. Despite many of the nominal changes in law from one government to the next, local practice changed relatively little, as the community allocated resources in a fairly consistent way among community members. Jericho's sustained level of agriculture has been possible because of the consistently high output of a large spring, Ein Sultan, just north of the contemporary city. The second chapter examines the transition from Israeli to Palestinian control of Jericho in 1994, which is now considered an Area A zone in the West Bank, and examines the relationship of nascent Palestinian

water institutions with previous informal networks. The last section addresses the challenges facing Jericho today, referencing and analyzing the recently written Master Plan for Jericho's water system undertaken by a Palestinian nongovernmental organization. The Plan effectively highlights problems within the system of allocation, including: poor water quality, inefficient domestic and irrigation networks, conspicuous local consumption, ineffective pricing systems, and lack of wastewater treatment. However, the plan does not provide long-term suggestions to address the underlying systematic problems with the allocation system. Although Jericho is theoretically a Palestinian controlled municipality, it faces serious obstacles to effective governance of its resources. The informal institutions dominated by the agricultural sector that sustained the community for such a long time, may not be able to adjust in the face of necessary water reform for the city. The local government may need to consider politically unpopular decisions, reform tariffs, and decrease reliance upon foreign aid if it hopes to continue maintain and manage Ein Sultan and other water sources for the growing city into the future.

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Introduction

Jericho claims to be the oldest continuously inhabited city in the world, with the earliest indication of a settled community dating back to the Natufian culture, circa 9200 BC.1 In an arid region that is largely inhospitable to settlement, Jericho is blessed with nearby groundwater and spring water, which have contributed to its resilience in face of environmental, political, and economic changes. Its largest spring, currently known as "Ein Sultan," has provided the greatest and most constant supply of potable water to the Jericho region for many years. While the contemporary city of Jericho is located some miles south of the spring, the original settlement was directly next to this important source of life. Because of its importance as a basic human need for the creation and maintaining of human civilization, the presence and control of water necessarily influence who holds power within a community. The control of Jericho's water supply remains an important factor in power relations and the functioning of the city eleven millennia after the founding of its original settlement.

In many human civilizations, crop irrigation consumes more water than domestic uses, so farmers have traditionally played an important role in the control of water resources. The shift during the modern period from rural to urban centers has changed the pressures of allocation from irrigation to domestic water. The changes that have occurred within Jericho represent, in miniature, the larger conflicts within societies across the Middle East, as forces of "modernization" and political change have vied with traditional cultural norms. For example, in the past century alone, the city of Jericho has been under the rule of five different governments. This paper examines how these changes in the

[1] Bar-Yosef, O. "The Walls of Jericho: An Alternative Interpretation. *Current Anthropology.* 2.2, (Apr, 1986), 157.

governing structure of the city affected the management, allocation and use of water resources.

This research will not take up the highly contentious and increasingly dialectical issue of water allocation and use between Israel and the Occupied Palestinian Territories. This often-debated theme has become emblematic of the larger conflict between the two and will undoubtedly be a primary negotiating point of any future peace agreements. However, in order for this study to be fully contextualized, it is necessary to briefly recognize the realities of this litigious debate. Although there is more or less a scientific consensus about what technically needs to be accomplished so that water can be efficiently and safely harvested, treated, and distributed, the international and domestic political challenges make such achievement much more complex. Human rights groups and multilateral organizations alike have documented the challenges of a system in which Palestinians consume significantly less water per capita than Israelis. As reported by a 2007 World Bank study:

Water withdrawals per capita (gross water withdrawals divided by the population) were calculated in 1999 as 190 [liters per capita per day] lpcd for West Bank Palestinians, about 1,000 lpcd for Israelis, and about 870 lpcd for settlers. By 2007, availability had declined, and the Palestinian population had access to only about one quarter of the ration of their Israeli counterparts: West Bank Palestinians had about 123 lpcd, and Israelis about 544 lpcd.2

[2] World Bank Report, No. 47657-GZ, "West Bank and Gaza: Assessment of Restrictions on Palestinian Water Sector Development." (Apr. 2009), 13.

Palestinians, Israelis and third parties disagree about facts, responsibilities and for addressing these challenges in water allocation.3 Some authors utilize the topic of Israeli-Palestinian water allocation and consumption as an example with which to argue their chosen angle about the conflict.4 Some analysts argue that water is inherently a source of conflict, whereas others claim that it instead provides unique opportunities for cooperation and acts as a stepping-stone toward peace. Despite the multitude of opinions and narratives about the implications of cross-boundary allocation of water between Palestinians and Israelis, comparatively little has been written about the present situation of internal allocation within a Palestinian community in the West Bank or Gaza Strip. Domestic water allocation and its implications within the Palestinian Authority represent a topic that has been under-studied.

This thesis examines water allocation in Jericho, a municipality in the West Bank that has been controlled under the auspices of the Palestinian Authority (PA) since the transition of civil and security control of the city from Israel in 1995. This paper addresses some of the challenges and prospects of water allocation and distribution within a Palestinian controlled framework. Given the truly intertwining nature of the PA and the Israeli government and their history, it would be difficult to completely divorce the influence of Israel in the region. However, this thesis seeks to elucidate internal Palestinian water allocation, a field under-represented in the literature, rather than focus on cross-boundary interactions. The report begins with an examination of the previous

3 see the Israeli government's official response to Amnesty International's piece entitled "Troubled Waters- Palestinians Denied Fair Access to Water" in which the Israeli government denies all claims against it, relying on counter-evidence. Hard facts are used by both sides and can easily be bent to favor one position or another in such heated debates.

4 For several examples of books that take up this issue see: Jan Selby, *Water Power and Politics in the Middle East: The Other Israeli-Palestinian Conflict* (2003); Alyn R. Rouyer, *Turning Water into Politics: The Water Issue in the Palestinian-Israeli Conflict* (2000); and Miriam R. Lowi, *Water and power: The politics of a scarce resource in the Jordan River Basin*. (1995).

systems of water administration. In the past one hundred years, Jericho has been under Ottoman, British, Jordanian, Israeli and Palestinian control. This rapid succession of control has affected the gradual formation of practice and patterns of use within Jericho. In many cases, even after a period of rule ended, practices and laws created under the previous ruling government were restated, modified slightly, and left in place by the following government.

The study will then move into existing framework for water allocation in Jericho as illustrated by a Master Plan for the municipality organized by a prominent Palestinian nongovernmental organization. The plan addresses formal and informal water allocation institutions, which indicate priorities of local development.

The Palestinian state, despite the appearance of authority, remains a weak state even within areas, such as Jericho, in which it has nominal control. The actions and practices of the members of a society can often be far removed from the laws as they are written.5 This paper examines this phenomenon by exploring not only the challenges, but also the prospects of allocation within the municipality, as a means for better understanding of water management issues in a state grappling with weak and developing infrastructure.

[5] See Joel Migdal's theory of the state in society presented in *Strong Societies and Weak States: State-Society Relations and State Capabilities in the Third World*. (1988)

Chapter One

Jericho: The "oldest, continuously inhabited city in the world"

Jericho is perhaps best known throughout the world for the Biblical narrative in which Joshua fights the Battle of Jericho and destroys the city and its inhabitants. After crossing the Jordan River, Joshua and his followers came upon Jericho as the first major city of Canaan. As instructed by his God, Joshua and his army marched around the walls of Jericho once a day for six day and on the seventh day circumambulated it seven times. During the final circuit, the priests of the Covenant blew their horns and the soldiers sounded their battle cries. The walls came crashing down, allowing the Israelites to successfully invade the city. According to the narrative, Joshua's forces destroyed Jericho and all of its inhabitants completely: men, women and children alike, all save the prostitute, Rahab, who had aided the Israelite spies, and her family.[6] After Jericho's destruction, Joshua warned that any man who attempted to rebuild the damned city would forfeit the lives of his children.[7] Detailed archaeological analysis of the site has documented that the city of Jericho was deserted at the time of the Israelite conquest of Canaan. [8] However, the story of "Jericho's walls coming crashing down" remains an integral part of Christian theology and the dramatic events are ingrained in the minds of young and old, believers and non-believers alike. When an individual living outside the region hears the name "Jericho," it is likely that some variation of this Biblical narrative is what comes to mind and not the present-day city in the West Bank.

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[6] Joshua 6: 1-25.
[7] Joshua 6: 26-27.
[8] Bar-Yosef, O. "The Walls of Jericho: An Alternative Interpretation. *Current Anthropology.* 2.2, (Apr, 1986), 157.

It is significant that the city of Jericho was included as the location for the Israelites first battle. Jericho was recognized as a key city of the region and a visible marker of pre-Israelite society. While the dramatic and miraculous crumbling of the walls may be historically inaccurate, excavations of the city have shown that main characteristics of the city included structural oddities for its time: relatively high outer walls and a tower.[9] What allowed the civilization at Jericho to prosper in ways that were impossible for other settlements in the area? A key factor must have been its access to a constant and reliable water source.

Jericho also figures prominently in the Biblical narrative of the prophet Elisha, who came to a contaminated spring near Jericho at the request of the people, to purify its waters by sprinkling salt into the spring, cleansing it of all disease and making it potable for generations to come.[10] Ein Sultan is likely the same spring; to this day, some refer to this spring north of present-day Jericho as "Elisha's Spring." This second Biblical narrative highlights not only the importance of access to a water source for successful settlement, but also the concrete danger posed by polluted water for settlements.

The concern for both water quantity and quality are not limited to the distant past. In the twenty-first century just as it was millennia ago, the control over allocation and quality of water is still dictated by and often determines power structures within a community. Polluted water poses a threat for the health and economic well-being of individuals and the community as a whole and must be addressed for the society to flourish. In the story of Elisha, it takes no less than a prophet to save the water, and by extension the people of the region who depended upon it.

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[9] Bar-Yosef, O. "The Walls of Jericho An Alternative Interpretation." *Current Anthropology*. 27.2 (Apr. 1986), 157. (Note: this author actually proposes that the famed walls of Jericho were built to protect the city from the unpredictable flooding and mudflows from Ein Sultan, rather than to protect it from some enemy)

[10] 2 Kings 2:21

The concrete implications of the spring for the town are evidenced by Jericho's resilience in the face of sociopolitical and environmental challenges impeding continued inhabitation of this small city. While many Old Testament cities and towns are now nothing but excavation sites for archaeologists and tourists, Jericho remains one of the few cities that have withstood the test of time. The city and its inhabitants have not been immune to the changes in leadership and the influence of outside forces. However, Jericho's continued existence, despite Joshua's Biblical admonition, demonstrates the city's self-sufficiency and resilience throughout the years. The flow of Ein Sultan has been measurably constant for nearly a century. A British survey conducted in 1936 measured Ein es Sultan's yield at approximately 600-700 cubic meters an hour, much the same as it is today.[11] The evidence of pre-historic settlement demonstrates that the spring has been sufficient to sustain settled populations for millennia. The remarkably constant output of the spring has undoubtedly been one of the primary sustaining factors of the city.

While other towns may have withered away as seasonal precipitation patterns changed, or seasonal climatic variations shifted, Jericho's source of water was constant enough to sustain its inhabitants through these potentially devastating changes, both environmental and socio-political. The following section provides an overview of Jericho's water resources, as its natural resource wealth is a primary reason for its longevity.

[11] Gottman, Jean. "The Pioneer Fringe in Palestine: Settlement Possibilities South and East of the Holy Land. *Geographical Review.* (Oct 1937), 558.

Geographic and resource overview

Jericho is located within the Jordan River Basin, approximately twenty kilometers from the Jordanian border in the northern region of present day West Bank. The Jordan River Basin is part of a series of rift valleys, stretching from Syria into the Rift Lakes of Africa, and this geological fault line affects the hydrological resources of the Jordan River Basin. In addition to the water from the Jordan River itself, the area surrounding Jericho has an abundance of groundwater, located in both shallow and deep aquifers, accessible through a series of naturally occurring springs that mark the area. Throughout recorded history, the spring Ein Sultan (or "spring of the Sultan" in Arabic), located just north of the present-day city has provided a constant and sufficient supply of water to the residents of Jericho. A study conducted by the Palestinian Hydrology Group (PHG) reported that Ein Sultan's recharge area is quite far from the discharge area, as is evidenced by the notable difference of composition between the rocks around the discharge area of the spring and the quality of the spring itself.[12]

The spring is one of the largest in a chain of springs in the area fed from aquifers located in the Judean Mountains to the East.[13] The distance between the recharge zone and the spring, as well as the substantial size of its storage area, contribute to its continuous and substantial output of approximately 650 cubic meters per hour (m^3/hr) or 15,600 m^3/day.[14] That is the equivalent to the amount of water needed to fill just over six Olympic sized swimming pools each day. The groundwater that comes to the surface at Ein Sultan has remained the main source of water in Jericho today. Despite the proximity of the city to the Jordan River, the municipality does not have the authority to utilize any

[12] Jericho Draft Master Plan, PHG. 3.1 "Conventional Water Resources (surface and groundwater)", 21.
[13] Andrew Sherratt (2004), 'Sites from Satellites: Jericho, Jordan', ArchAtlas, February 2010, Edition 4, http://www.archatlas.org/SitesFromSatellites/sites.php?name=jericho, Accessed: 14 March 2012
[14] ibid

of its water because of Israeli restrictions, as only a limited number of specific residents of the Jordan River Basin are allowed access to its waters. As per the stipulations of The Jordan-Israeli Peace Treaty signed in October 1994, water from the Jordan River is allocated between Jordan and Israel with specific amounts entitled to each that vary during the summer and winter periods.[15] There is no explicit allocation of water from the Jordan granted to Palestinians. The treaty signed about a year later between the Palestinian Liberation Organization (PLO) and Israel, grants the Palestinians general water rights, but does not mention the Jordan River specifically.[16]

Jericho is also situated between two large systems of *wadis*, valleys or dried riverbeds that channel floodwaters and other runoff during certain periods of the year, Wadi Qilt and Wadi Nwaimah (alternatively spelled Nu'eima depending on the transliteration from Arabic to English). Wadi Qilt extends to the west of the city and Wadi Nwaimah runs north of it. The average annual total flow of each total 1.4 million cubic meters (Mcm) and 0.945 Mcm respectively.[17] Jericho does not rely on this runoff to supplement its water resources, although some local individuals have created small-scale harvesting projects in the wadis for individual use such as gardens.[18]

Compared to other regions of the West Bank, Jericho has access to significantly more water resources than many of the cities further in the north, such as Tubas and Tulkarem, which often suffer severe water shortages.[19] Even larger cities such as Bethlehem and Ramallah face seasonal shortages, in which running water may only be

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[15] *The Jordan – Israel Peace Treaty*. (26 October 1994) Annex II, Article I. Accessed via Allan, JA. *Water, Peace and the Middle East Negotiating Resources in the Jordan Basin.* New York, 1996, pp, 216.
[16] *The Israel- PLO Interim Agreement* (28 September 1995). Accessed via Allan, JA. *Water, Peace and the Middle East Negotiating Resources in the Jordan Basin.* New York, 1996, pp, 227-34.
[17] PHG *Draft Master Plan Jericho*. 3.3 "Non Conventional Resources." 24
[18] Bsharat, Jalal. *Personal Interview*. 28 Jan. 2012.
[19] "Water for Life." *Palestinian Hydrology Group, WaSH MP.* (2007-8), 49.

available once every two weeks for a household.[20] Given this relative abundance, Jericho has a long history of settlement and agricultural activity. The ways in which resources are currently allocated are closely tied with historical economic priorities and sociopolitical institutions.

Ottoman Era: 1516-1918

The Ottoman Empire controlled the area of Palestine in at least a nominal capacity for over four centuries, from 1516-1918.[21] Despite this broad stretch of rule, power remained decentralized for the majority of the outside rule, and there is limited research about areas in the periphery, such as Jericho. As is evidenced by the portrayals of Westerners at the time, Palestine was often cited solely as an historical land of the Bible, without considering the daily socioeconomic and political realities of the area. Until recently, the literature has been dominated by the problematic dichotomous distinction between pre-modern and modern (i.e. after contact with Europe) Palestine.[22] Existing texts focus mainly on top-down political organization of the Empire and changes thereof. While in the past several decades, the study of pre-nineteenth century Palestine has begun to broaden, significant gaps remain in published information on the daily lives and practices of Jericho's residents during the Ottoman period. This gap in the literature is especially important because within the decentralized nature of Ottoman Palestine, the strong local ties in villages, cities and clusters of cities were more telling than the broadly imposed retrospective categorizations of life in the city.[23] Details about small towns like

[20] Qannam, Ziad. *Personal Interview*. 14 June, 2011.
[21] Biger, Gideon. The Boundaries of Israel-Palestine Past, Present, and Future: A Critical Geographical View." *Israel Studies*. 13.1 (Spring 2008), 70.
[22] Doumani, Beshara B. "Rediscovering Ottoman Palestine: Writing Palestinians into History." *Journal of Palestinian Studies*. 21.2 (Winter 1995), 6.
[23] Doumani, "Writing Palestinians into History," 16.

Jericho, aside from the occasional, personal commentaries and locally inspired narratives, leave much to be desired for the researcher interested in informal institutions and internal politics, such as those governing water use, especially in rural areas, for which obtaining information is especially difficult.[24]

Prior to the Ottoman period, there was little centralized control, or formal written laws governing the allocation of water in Palestine. Agreements were generally made within a community, specifically within the prevalent tribal (i.e. extended familial) structures in which members divided access to water internally for domestic and agricultural use. While informal institutions have persisted until today, the imposition of outside rule and formal laws governing practices affected the ways in which land and water were recognized and allocated. Given the primacy of agriculture, control and allocation of water was closely tied with laws governing the land. During the early Ottoman period, land was awarded as a result of conquest, and the dominant system resembled feudalism. Technical "ownership" in such cases had little to do with who had traditionally or historically lived and worked on the land, but instead was nominally possessed by a small group of Ottoman elite. The land laws theoretically demarcated lands based on its use and location comparable to the city as detailed below:

> …the theory underlying land law was that all land was owned by the Sultan by right of conquest, with the exception of *waqf* [religious endowments inherited from family members] and *mulk* [land adjacent a private resident] land. All the lands owned by the Sultan, comprising arable fields, meadows, summer and winter pasturing grounds, woodland and the like, were termed *miri*. This was specifically a term used to define lands within a given village, whereas the areas between villages and those used for civil works like roads, were considered *matrouk*. Outlying areas that held little potential and was not technically owned by anyone fell under the category *mawaat*, or dead land.[25]

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[24] For an example of such a personal history written by a local see: Shihadah, Fawziyah. *Ariha: dirasah hayadariyah*. (1985). in Arabic.

[25] Shehadeh, Raja. *The Land Law of Palestine: An Analysis of the Definition of State Lands.* 87.

From these distinctions, it is noteworthy that Ottoman law differentiated between lands which were arable and those that were not. While these land laws did not specifically enumerate the ownership of water resources, the presence of water resources changed the nature of the classification of the land and its level of interest for the Empire. The majority of Palestinian land was technically owned by the emir, or prince, and therefore was in a special class of land known as *emiri*.[26]

However, the Ottoman version of a feudal system did not prove to be either an effective way of taxing the population or producing from the land, and it was replaced in the early nineteenth century by a system of tax farming in which the peasantry was often exploited to the benefit of the government intermediaries.[27] When this system also failed in its objective of efficient taxation, the Ottomans established a Land Code through which ownership of land was officially granted by the government to individuals who paid a specified fee for its use.[28] The *miri* lands that constituted the majority of Palestine were therefore owned by individuals with the right of their ownership acknowledged by the Ottoman government. These reforms were characteristic of a broader trend throughout the Ottoman Empire to reform and modernize in the face of competition from the increasingly threatening European powers. However, many of the reforms remained superficial, and actual practice continued much as it had for centuries. The felahadin (peasant farmers) did not immediately change their practices of land and water use or adopt reforms dictated from above.[29] This gap between law and practice would continue to be a dominant factor of use of water in the region for years to come.

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[26] Shehadeh, Raja. *The Land Law of Palestine: An Analysis of the Definition of State Lands.* 84
[27] ibid.
[28] ibid. 85.
[29] Nadan, Amos. *The Palestinian Peasant Economy: A Story of Colonial Bungling* (2006).

During the *Tanzimat* period beginning in the early nineteenth century, the Ottoman government attempted a series of reforms in a bid to maintain its regional power after suffering a series of embarrassing defeats at the hands of European powers. While primarily centered on modernization of the military in the center of the Empire, the reforms also sought to modernize other aspects of the Empire in the periphery. At that time, Jericho was located within the *Sancak* of Jerusalem, a part the larger Ottoman provinces that combined historical Syria and Palestine. The predominant economic activity of the region was agriculture; however, despite declared initiatives on the part of the Ottoman government, there was little real reform in this sector.[30] While patterns of classification for natural resources changed, the use of these resources remained fairly constant. The state had little success implementing reforms further away in the peripheries of the Empire, especially in rural areas.

While it is clear that reforms may have carried little weight in Jericho and other parts of the periphery of the Empire, it is possible to speculate on the conditions for water allocation in the city. The water of Ein Sultan was channeled through a system of canals, or *qanat*, to various areas of the city for agricultural and domestic consumption. Although there is no specific information about the families that lived in the city, these extended familial networks would have most probably been the primary method of organizing who within the community accessed water and when. Often, towns that depend upon a spring established a rotating system of allocation, in which each of the main families of the community had access to water for a given period of time before it moved to the next family. Water in the region is often still allocated by units of time, as a vestige of this basic system of sharing. This allocation network often operated with the

[30] Ma'oz, Moshe. *Ottoman Reform in Syria and Palestine. 1840-1861. The Impact of the Tanzimat on Politics and Society.* Oxford: Clarendon Press, 1968. 163.

opening and shutting of gates within the *qanat* system. Among this larger network of families, water was then divided into allocation for individual members as deemed necessary. Powerful families and clans definitely had greater water privileges, and conversely those who controlled this allocation schedule must have wielded considerable weight in the sociopolitical fabric of the community itself. These assertions about the structure of Jericho's water sector are based on reports of other cities in the region, as well as the vestiges of the system that were noted later, rather than concrete reports from the period.

Small towns of the periphery of the Ottoman Empire were also subject to raids by the Bedouin and the farmers of Jericho, like many other small towns and settlements, faced these added obstacles to maintaining a successful and stable existence centered around agriculture.[31] Often described as an oasis, Jericho must have made a rich target for these raiding bands. The blessing of abundant water in a largely arid region obviously did not come without complications for the town. However, despite the plethora of challenges facing the success of agriculture in the city, it remained the chief economic activity of the time. This ingrained importance of agricultural activity has implications for the future of the city, as is discussed in following chapters of this thesis.

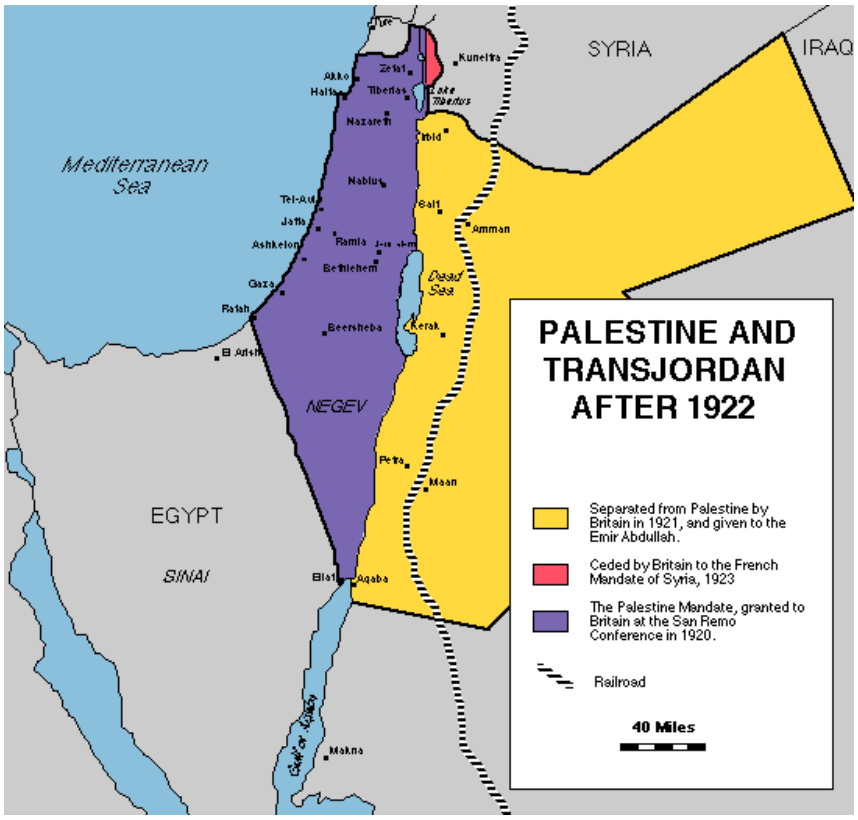
British Mandate Period: 1922-1947

After the Ottoman defeat in World War One, the victorious Allies negotiated the future of territories of the former Empire, and paid particular attention to Palestine. After several rounds of revisions, and input from American, British and Jewish interests (notably leaving out direct representation of the interests of Arabs living in the area), the

[31] Ma'oz. 132.

final draft of the Mandate for Palestine was approved by the Council of the League of Nations in the summer of 1922.[32] In 1924, an amendment was added to the Mandate rescinding British power over the areas recognized as "Trans-Jordan" to the east of the Jordan River.[33] However, Jericho and its surrounding areas remained under auspices of the British mandated "Palestine." (see Figure 1.1)

Figure 1.1 The Borders of Mandate Palestine and Trans-Jordan



Source: Dartmouth Middle East Maps Collection: "Palestine and Trans-Jordan, 1922" <http://www.dartmouth.edu/~gov46/pal-transjrdn-1922.gif>.

[32] *Mandate for Palestine*. US Department of State, Division of Near Eastern Affairs, 20.
[33] *Mandate for Palestine*. US Department of State, Division of Near Eastern Affairs, 24.

In many other parts of its Empire, the British selectively supported local leaders, and thus ruled by proxy; this was not the case in Palestine. The British did not encourage and support existing, traditional, tribal leaders within Palestine; instead, they ruled directly from Jerusalem without the support of local strongmen.[34] The relatively laissez-faire attitude of the British toward Palestinian political institutional capacity-building not only created a power vacuum that was advantageous for nascent Jewish institutions, but also had significant consequences for the future abilities of any Palestinian state. The problem of decentralization and lack of cohesiveness of Palestinian institutions, specifically the water sector will be discussed in detail in the coming chapters.

During the Mandate era, the British maintained many of the land and water laws from the Ottoman Code, although, they modified the laws to fit the British style of imperial governance. The reforms that were implemented were only those deemed necessary for "efficient governance" of the territory.[35] The British did, however, decrease the land taxes levied on the fellahin from the taxes enforced during Ottoman rule, by combining various taxes levied by the Ottomans into a flat ten percent land tax.[36] As one author points out, the most important changes made by the British during this time were administrative policy changes, which in fact proved useful after transition to Jordanian rule. In addition to the changes in the tax code, the British reopened Ottoman registries that had been closed after World War I.[37] By making such administrative improvements, the British were attempting to quantify and organize systems of ownership and allocation that were haphazard and informal.

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[34] Migdal, Joel. *Through the Lens of Israel*. 34.
[35] Nadan, Amos. *The Palestinian Peasant Economy: A Story of Colonial Bungling* (2006).
[36] Nadan, 29.
[37] Fischbach, Michael R. "The Implications of Jordanian Land Policy for the West Bank." (Summer 1994) p 493.

The Order-in-Council of 1922 that began the Mandate period introduced of a new category of land, "state land," which the Order classified as: "all lands in Palestine which are subject to the control of the government of Palestine by virtue of Treaty, Convention, Agreement or Succession and all land which are or shall be acquired for the public service or otherwise."[38] This way of defining state land seems to have been unprecedented in the region. Despite the nominal change, the notion of land and its resources as public goods as defined by the British remained a foreign concept. Land categorized as "*waqf*," or religious endowments, often provided public services, including fountains and public water access points. However, these *waqf* endowments were still privately managed and their actions were considered to be charity rather than public goods.

Under the British Mandate, water was managed and consumed much as it had been under Ottoman rule. Inequalities existed between water-rich and water-poor actors within this traditional framework of allocation. However, this privately operated informal system created a framework that stood the test of time and was remarkably resilient to changing structures of government and formal power. Within a small "irrigation community" that collectively shares its water resources, the individuals are be more likely to consider the entire community and share in the droughts and surpluses equally.[39] This terminology is particularly relevant for Jericho, as the family networks that controlled allocation of this irrigation community were all invested in and tied to the successes and failures of the allocation system as a whole. While more politically powerful members with greater clout may have enjoyed a greater percentage of the

[38] Shehadeh, Raja. *The Land Law of Palestine: An Analysis of the Definition of State Lands.* 88-9
[39] Trottier, Julie. "Allocating and Managing Water for a Sustainable Future: Lessons Around the World." *Natural Resources Law Center*. University of Colorado School of Law. (June 2009), 9.

spring's output at any given time, these systems were remarkable for their resilience to outside change.[40]

The Mandate Era was also marked by increased archeological expeditions, attempts to survey the land, and the beginnings of tourism. The British fascination with Palestine is reflected in the plethora of surveys and teams sent to the "Holy Land" during the Mandate era. Even before the Mandate had been officially approved, there were expeditions sent into the region to determine the possibilities for development and settlement. The number of Westerners traveling to Jericho as either explorers or religious pilgrims increased significantly during the Mandate period, and travel logs and reports on Jericho of the time reflected a negative perception of the small town. Hoping to encounter idealized versions of picturesque Biblical towns, British pilgrims were distraught to find the people living in what they considered abject poverty. Many were put off by the lack of hospitality they felt their excursions warranted. One British travel book predating the Mandate stated: "The inhabitants of Jericho are obtrusive, and the women have not the best reputation. The traveler should be on his guard against thieves… The inhabitants, about 300 in number, seem to be a degenerate race, on whom the hot and unhealthy climate has had an enervating effect." [41] While this language may seem unseemly for readers today, its tone typifies the general attitude of British travelers and explorers to the people of the region. Ein Sultan is also mentioned as a daytrip of interest because of its importance in the Biblical narrative of the prophet Elisha.[42]

In addition to their interest in Jericho's role in Biblical lore, the British remained interested in it and surrounding areas because of perceived potential for agricultural

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[40] ibid
[41] Baedeker, Karl. *Baedeker's Palestine and Syria.* (1906), p 127-128.
[42] ibid, 128-9.

development. In 1923, as part of a larger survey of the territory, the British sent a team to map in and around Jericho for the irrigation of state lands.[43] The British set about establishing many centers for agricultural development and research throughout Palestine during the Mandate Period. With the classic imperial mentality of "saving the backward Palestinian peasants" from the ignorance and neglect of the Ottoman period, and the *fellahin* farming techniques, the centers incorporated research and innovations from across the British Empire in order to improve the agricultural techniques and output of Palestine.[44] One such agricultural research institution was located just outside of Jericho.[45]

The British saw the potential for great agricultural advancement in Jericho and the surrounding lands. One surveyor reporting on the possibilities of settlement in Palestine described Jericho as "an islet of greenery in a red and yellow waste."[46] The method of water distribution at the time consisted of a channel connecting Ein Sultan to the fields of the fellahin. The "state" supervised the allocation of the water to each of the eight divisions of the land that received this allocation every twenty days. Although, the open canal, or *qanat*, system was not considered a marvel of modern technology, the author heralded this process of distribution for its ability to decrease the mosquito population that was such a perennial problem in the humid area.[47]

As late as 1930, fifty-three percent of the settled population in Palestine was engaged in agriculture and the fellahin produced approximately ninety percent of the

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[43] Gavish, Dov. *Survey of Palestine Under the British Mandate, 1920-1948*. (1993) p. 70-80.
[44] El-Eini, Roza. "British Agricultural-Educational Institutions in Mandate Palestine and Their Impress on the Rural Landscape." *Middle Eastern Studies*. 35.1 (Jan, 1999), 98.
[45] ibid
[46] Gottman, Jean. "The Pioneer Fringe in Palestine: Settlement, Possibilities South and East of the Holy Land." Geographical Review. 27.4 (Oct 1937) p. 558
[47] Gottman p. 558-9

vegetables during the Mandate.[48] Therefore, improving the yield of the agriculture was of great importance for the British and they established a research institution for agriculture in the Jericho area.[49] The British had high hopes for the project; one British prospector in 1937 went so far as to compare the possible yield of the Jordan River Basin area to that of the Nile.[50] Although the flow from the Jordan was indeed considerably higher at the time, such high hopes were obviously extrapolations, ignoring the important hydrological and agricultural differences of the two riparian areas. There were also systematic problems with the implementation of these reforms, as described by Amos Nadan in his study of the Palestinian peasants under the Mandate era:

Irrigation with easily accessed water could have developed further if certain institutional constraints had not existed. Under the official *Mejelle* law, inherited from the Ottomans, the government owned all the water. This law dealt with upper-ground water, the main source of free water. The practice was otherwise, however, since the government did nothing to enforce the right until 1944 and not much after that. Consequently the custom that the landlord who had water on a plot of land also owned it was the de facto law.[51]

The British legislation, in other words, lacked the necessary mechanisms to enforce its policies and therefore lacked legitimacy in practice. According to Nadan, the Mandate government only supported irrigation reform superficially and did little to actually change the way that water allocation functioned before the Mandate. The

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[48] El-Eini, Roza, I.M. "The Implementation British Agricultural Policy in Palestine in the 1930's."(Oct., 1996), p. 211-212.
[49] El-Eini, 219.
[50] Gottman, 558.
[51] Nadan, Amos. *The Palestinian Peasant Economy: A Story of Colonial Bungling* (2006), 66.

Mandate government ultimately failed to create a lasting infrastructure for irrigation and water allocation that would have been an economic boon to the region.[52]

A British irrigation engineer, Dawson Shepard, updated the system of water distribution in 1929 for the first time since the Herodian era aqueducts had been built.[53] Commenting on the perceived ineffectiveness of irrigation from these springs, Shepard stated: "It is a difficult thing to prove but, on observation, one is forced to the conclusion that little more than 20% of the water originating from the springs does useful work."[54] Despite the British efforts to reform the irrigation and agricultural practices of Palestine, to a large extent they failed. The agricultural centers represented to Palestinian resistance fighters a symbol of the British power itself and were therefore targeted during anti-imperial campaigns. The Jericho agricultural and experimental station itself was targeted and badly damaged during the Arab Revolt of 1936-1939.[55] A retroactive report indicates that despite the considerably large amount of resources that the British poured into these stations, that: "probably very little impress of any lasting value was made on the Arab community because of its own inherent problems, economic conditions, culture and political events as they unfolded."[56] These ill-fated attempts by the British demonstrate that the policy of imposing "expert" advice upon communities, even if grounded in empirical experimentation and research, fail when the needs and practices of the community are not considered. The British had great faith in the power of education and technological advancement, but the ultimate failure of their project demonstrates that

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[52] Nadan, 112.
[53] Ruby, Robert. *Jericho: Dreams, Ruins, Phantoms*. (1995) p. 86 and Amos Nadan, *The Palestinian Peasant Economy: A Story of Colonial Bungling* (2006), p. 29.
[54] Nadan, 62.
[55] El-Eini, 110.
[56] El-Eini, 111.

a one-way, top-down approach to education will do little to improve the long-term habits and engrained cultural patterns of consumption.

In 1947, the British government made the decision to withdraw from Palestine, as part of its larger project of de-imperialization after World War II. The United Nations then sent a delegation, the UN Special Committee on Palestine (UNSCOP), which was tasked with determining what to do with the troubled area. The twenty-five years of British control had little effect on the institutions of water allocation and agriculture in Jericho. Despite lofty rhetoric and goals to advance Palestine through technological and infrastructure development, little of this came to fruition because of the Mandate government's inability to carry through with its promises of advancement to "modernity." By the end of this quarter-century, the institutions and systems of water allocation in Jericho looked much the same as they did before the British arrival.

Jordanian Period: 1950-1967

Following the Arab-Israeli War of 1948, Jordan took control of the West Bank of the Jordan River as part of the Armistice Agreement with Israel.[57] The annexation formally occurred in 1950, transferring 5,642 square kilometers or 5,633,000 dunums to Jordanian control, which lasted until 1967.[58] (see Figure 1.2)

[57] Efrat, Elisha. "Changes in the Settlement Pattern of Judea and Samaria during Jordanian Rule. *Middle Eastern Studies*. 13.1 (Jan 1977), 97.
[58] Fischbach, Michael, R. "The Implications of Jordanian Land Policy for the West Bank." *Middle East Joutnal*. 48.3 (Summer, 1994), 493.

Figure 1.2 Map Showing West Bank as part of the Hashemite Kingdom of Jordan

Source: UT Map Collection. "Jordan" (Shaded Relief, 1972) <http://www.lib.utexas.edu/maps/middle_east_and_asia/jordan_rel_1972.jpg>

While local Palestinian governance had been largely untouched by British policies, Jordanian rule changed the centers of power. Palestinian national movements that had begun under British rule faded out as most of the positions of power (such as mayorships and representation in the capital, Amman) were awarded to the traditional and conservative elite, loyal to the Jordanian king and dedicated to the preservation of their power.[59]

[59] Ma'oz, Moshe. *Palestinian Leadership in the West Bank.* (1984), p. 9.

Because both Jordan and the West Bank had been under British rule for a period of time, the land policies were relatively similar and facilitated an easier transition of power for the territory, than may have otherwise been anticipated.[60]

Whereas water settlement came much later than land settlement in the East Bank, growing awareness of the importance of irrigated lands to the national economic convinced Jordanian officials to settle water rights in the West Bank from the outset. In fact, the first settlement announcement issued by the lands department in 1952 concerned not land but water rights in Jericho.[61]

From that point forward, the Jordanian government settled water rights in the West Bank at the same time as land rights. In an effort to improve the structure of taxation in the West Bank, the Jordanian government attempted to revamp the structure of water rights. Instead of linking water rights to units of time corresponding to the amount of irrigated land one owned, the government attempted to tie water to land.[62] However, the Jordanian government soon realized that it was difficult to change ingrained attitudes and habits regarding water allocation within a community, and that some people continued to have a disproportionate access to water.[63] During the Jordanian period, the government continued a policy of selling and leasing state land, including land along the Jordan River Valley that had not been settled during the British Mandate.[64] Much of these areas consisted of lands that had formerly been classified under special categories such as state land, or land owned by the Ottoman sultan personally.[65] This reversal of Ottoman and British land laws demonstrates, to an extent, the gradual shift

[60] Fischbach, 493.
[61] Fischbach, 499
[62] Fischbach, 499-500
[63] ibid
[64] Fischbach, 500.
[65] ibid

from classification of state lands to increasingly privately controlled land and natural resources in Jericho and the rest of the West Bank.

The Jordanian administrators drew upon both British and Ottoman precedent and policies for taxation, land mapping and administration.[66] The Jordanian period of rule was considered a period booming growth and infrastructure development for many cities and towns in the West Bank.[67] Although *new* settlements did not develop in the area of the Jordan Valley and along the Dead Sea due to environmental challenges and the scarcity of water, the comparable oasis of Jericho flourished.[68] Despite the geographical and climatic extremes that made growth difficult in much of the rest of the surrounding region, Jericho, blessed as it was with a constant source of water, was one of the few cities in the Judean Desert that did thrive, growing seventy-three percent during the seventeen years of Jordanian rule.[69] In addition to its advantageous water resources, Jericho benefited from the political change, because it was located on the road between Jerusalem and the rest of Trans-Jordan, which became more widely traveled after 1950.[70] As a result of the West Bank's inclusion into the greater Trans-Jordan, and the changing system of roads and communication, the road undoubtedly did affect the growth of the city. However, without the steady supply of water provided by Ein Sultan, this growth would have been short lived at best. The growth of Jordanian rule in Jericho was primarily spurred by the creation of the Armistice Line between Israel and Jordan and the

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66 ibid, 493-4.
67 Efrat, Elisha. "Changes in the Settlement Pattern of Judea and Samaria during Jordanian Rule. *Middle Eastern Studies*. 13.1 (Jan 1977), 97. Note- the author used the older historical designations of "Judea" and "Samaria" because of specific geography and to limit the scope of his argument. The areas both lie inside the West Bank, covering all the area adjacent to the Jordan River and the Dead Sea.
68 Efrat, 103.
69 Efrat, 107.
70 ibid

money coming from Palestinians working in the Gulf, rather than deep economic development that resulted in sustainable economic opportunities in the region itself.[71]

Despite these elements of growth in Jericho, the level of individual debt also increased during the Jordanian control of the West Bank. In Jericho, registered private debt rose by an order of magnitude from 16,708 JD (Jordanian Dinar) in 1954, to 167,074 JD in 1966.[72] This trend occurred because during the period of Jordanian rule the land value of the West Bank increased and therefore farmers and other landowners could borrow more money against their more profitable land.[73] This conundrum demonstrates one of the most basic paradoxes of the period. The increased economic activity meant that residents of Jericho and similar towns began to realize a higher standard of living; however, these changes were not supported by deeper institutional development to support this growth. This disparity is particularly problematic for the water sector, as patterns of consumption and demand grew much more quickly than the infrastructures to support sustainable supply.

During the 1950's and 1960's the Jordanian government was also engaged in irrigation projects designed to capture and utilize available water resources more efficiently. Because the majority of Jordan is more arid than the generally dry climate of the West Bank, the irrigation projects were primarily limited to the areas on both sides of the Jordan, within the Jordan River Basin.[74] While some areas within this Basin utilized water harvesting from the seasonal runoff in systems of wadis (seasonal river valleys), the wadi systems of the West Bank of the Jordan were not as suitable for these sorts of

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[71] Efrat 111
[72] Fischbach, 502.
[73] Fischbach, 502.
[74] Davies, H.R.J. "Irrigation in Jordan." *Economic Geography.* 34.3 (July 1958), 264.

government funded irrigation projects and therefore were not as commonly found.[75] This remains largely the case today, as Jericho makes little use of runoff from wadis, and is discussed in greater detail later. In the Jericho region, there have been some small wadi runoff harvesting projects, but to a large extent, this water source continues to be largely underused.

The irrigation projects funded by the Jordanian government in and around Jericho were of a different nature. One author described Jericho in 1956 as a "veritable oasis" with "its many date palms."[76] The irrigation scheme in Jericho served the large surrounding area for a total number of beneficiaries estimated at 55,000 people and irrigating about 4,000 dunhams or about 988 acres.[77] These irrigation programs focused primarily on the production of water intensive, cash crops, such as citrus fruit, cucumber, cabbage and cauliflower.[78] Jericho, however, at the time was known for its date and banana growing industries.[79] These water-intensive cash crops could only be grown in a few very select parts of the West Bank because of climatic variables as well as access to adequate water. These differences in the possibility of crop cultivation were even more notable when comparing the effect of irrigation around Jordan's capital city of Amman and the water rich area surrounding Jericho.

Table 1.1 indicates the comparative consequences of irrigation on crop yield in the sub-district around the capital of Amman and the Jericho region. The crops that could be grown in Jericho were much more diverse than those that could be grown in other

[75] Davies, 268
[76] Davies, 269
[77] ibid
[78] ibid 270
[79] ibid

parts of Jordan, and irrigation yields in Jericho far exceeded yields in the capital of Amman.

Table 1.1 The Effects of Irrigation on Yield and Type of Crop Grown in Jordan

	Crop	**Amman sub district** ***(very little irrigation)***	**Jericho sub district** ***(nearly all crops irrigated)***
Yields:	Wheat	17.78 kgs [80] per dunam	354.00 kgs per dunam
	Tomatoes	304.80 kgs per dunam	338.33 kgs per dunam
Percentage of cropped lands:	Grains	91	52
	Bananas, citrus fruit, dates, tomatoes, cucumbers	0.41	28

Source: Davies, H.R.J. "Irrigation in Jordan." *Economic Geography.* 34.3 (July 1958), 271. (originally calculated by Davies from data found in the *Hashemite Kingdom of Jordan Statistical Yearbook,* 1955, Department of Statistics, Amman)

Bananas and other fruits and vegetables were seen as cash crops comparatively more suitable for the humid and hot climate of Jericho than the arid climate of Amman. However, these crops are also highly water intensive, calling into question the economic sustainability of diverting so much water to foreign crops to be sold for cash and export. Although Jericho was comparatively more water-rich than other parts of Jordan, it lacks

[80] The original measurement was in centum weight (cmts), a method of measurement, which in the Imperial system, generally equated approximately 112.0 pounds, or 50.8 kilograms. The data presented here has been converted to kilograms, so as to agree with the rest of the measurements used within this thesis.

the tropical excess of water of the environments in which bananas often grow. The economic investments during the Jordanian period of rule have ramifications for water allocation policy even today, with the prioritization of agriculture over domestic use, and the unwillingness to consider new sources of economic activity. The team investigating the irrigation projects in 1956 grappled with this very concept, concluding its mainly descriptive analysis with a question for the future: "The main problem left to be solved would appear to be an economic one. What crops of sufficient value can be grown in order to make the scheme pay for itself?"[81] The implications of those decisions will be examined in more depth in the last chapter.

Israeli Control: 1967- 1994

Israel took control of the West Bank (as well as the Golan Heights from Syria and the Sinai Peninsula from Egypt) following the defeat of the allied Arab forces in the Six Day War of 1967. Despite the widespread perception by Palestinians that Israeli occupation of the West Bank has been mainly negative, there were some important organizational and institutional reforms made during this period. Jericho was one of the towns in the West Bank whose infrastructure greatly improved during the time of Israeli control.[82] During the beginning of Israeli occupation, the Israeli government viewed the development of Palestinian institutions dependent upon Israel for support as a good economic and security investment.

After 1967, Jericho, like many other towns in the West Bank, was struggling to provide adequate and quality services to its residents and requested Israeli aid and technical support to develop its networks. Although Palestinian mayors initially accepted

[81] Davies, 270.
[82] Moshe, 81

and even sought out Israeli financial aid for development projects and infrastructure building, they became less willing to do so as time progressed and nationalist tendencies encouraged them to disengage from Israeli aid.[83] Israel supported development in the West Bank, but a very specific kind of development aimed at improving its own economy. The West Bank provided not only a new market for Israeli goods, but also a source of comparably cheap labor.

The Israeli government also enforced specific laws about the kinds of economic activity that could be conducted within the West Bank. In 1983 when Jericho was under the jurisdiction of Israel, the Israeli army issued Military Order No. 1039, which made it illegal for any person to grow vegetables in the Jericho district without specific permission from appropriate Israeli authorities. Although the stated aim of this order was to preserve water, it damaged the Palestinian agricultural sector, which had previously employed a large percentage of the Palestinians in the area.[84] Unregulated agriculture is still forbidden in portions of the West Bank, mostly Area C, a distinction that will be explained in the next section, and Israeli soldiers routinely destroy "illegal" farms. However, after the transition of power from Israeli to Palestinian control, Jericho no longer faces these restrictions on agriculture.

With the integration of the West Bank into the Israeli economy, Israel had specific goals, parallel to those of the British aimed at increasing the productivity of the land, especially within the agricultural sector.[85] Israel's Master Plan for the West Bank made these priorities clear in its mission statement:

> The underlying ideas of the proposed Master Plan are: development of agriculture for export; the urban development of Jerusalem and its satellites with a proportional growth of the various other towns in the area and their

[83] Moshe, 142.
[84] Amnesty International Report. 13.
[85] Abu-Ayyash, Abdul-Ilah. "Israeli Regional Planning Policy in the Occupied Territories." (1976), 96.

> adequate industrialization; the settlement of the unpopulated Jordan Valley and the Dead Sea area and making it arable; the expansion of agriculture wherever possible; utilization of available ground water resources; the clearance slums and refugee camps; the development of the economic rural functions of the bigger villages; the improvement of inland and air communications; the utilization of the tourist potential of the area for the benefit of the entire country; and the development of the periphery of Samaria and Judea so that it may become integrated with the rest of the country.[86]

Several of these goals dealt specifically with the use of water and how to best exploit the water resources of the West Bank for Israeli economic advancement. Therefore, although there was considerable growth in the realm of institution building during the Israeli period of rule, these developments were made with the stated intent to enhance the economy of Israel. When the time came to transfer power in Jericho from Israel to the Palestinian Authority, the governmental institutions in place were not those created to benefit autonomous Palestinian governance.

A 1993 newspaper report, directly before the transfer of power from Israeli to Palestinian control, gave voice to some residents of Jericho and their mixed reaction to the agreement. Many residents of Jericho heralded the agreement and the possibilities they saw for greater political freedom and economic investment with general enthusiasm. Others, however, were wary of an agreement that would give only a small part of the Palestinian homeland.87 Whereas many of the previous governments ruled from their own centers of power, which were physically and often socially removed from the area being governed, the period of Israeli rule in Jericho was different. For better or worse, decisions made during this time in the area affected Israeli economic, political, and

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[86] Abu-Ayyash, 95.
[87] Wylie, Bob. "Letter from Jericho." *New Statesman & Society*. 6.271 (Sept. 24, 1993): p13.

security interests. Therefore, the frameworks guiding governance, institutions and water allocation that the Palestinians of Jericho inherited were those set-up to benefit specific Israeli and not Palestinian interests. It had been in the best interest of the Israelis governing Jericho to ensure that any Palestinian institutions, including the water sector, were dependent upon Israeli support; so when the transition to Palestinian control occurred, the water sector was relatively undeveloped.

Chapter Two

Jericho under the Palestinian Authority

The peace talks between Israel and the Palestinian Liberation Organization in the 1990's, generally termed the "Oslo Accords," began with a reciprocal recognition of legitimacy between the two parties, led to a Declaration of Principles, and finally established the framework for an "Interim Period" in which power would gradually be transferred from Israeli to Palestinian control in certain areas.[88] Jericho was one of the two areas from which Israel began this transition immediately, as per the stipulations of the Gaza-Jericho Agreement signed in May of 1994.[89] Although the Gaza-Jericho Agreement addressed the main principles and framework for the transition of power, the plan was put into effect by the Agreement on Preparatory Transfer of Powers and Responsibilities signed in August 1995. Reflecting on that agreement later the same year, Raja Shehadeh described the primary challenges of the operation of the Palestinian state in the first months after Israeli withdrawal:

> Under Article II of the August 29 agreement, Israel has agreed to transfer 'powers and responsibilities from the Israeli military government and its Civil Administration in the West Bank in the following spheres: education and culture, health, social welfare, tourism, direct taxation and Value Added Tax on local production…' Thus Israeli military government, and its attendant Civil Administration, continues to exercise power in the West Bank except for those 'powers and responsibilities' turned over to the [Palestinian National Authority] PNA. The scope of the transferred powers is based on Jordanian laws (pre-June 1967) and Israeli military orders issues over the course of the occupation, some of which are illegal from the point of international law.[90]

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[88] "The Israel-Palestinian Negotiations." *Israel Ministry of Foreign Affairs*. online.

[89] "Gaza-Jericho Agreement." 4 May 1994. *Israel Ministry of Foreign Affairs*. online.

[90] Shehadeh, Raja. "Transfers and Power: The August Agreement and the Jordanian Option." *Middle East Report.* No. 194/195. May 1995, p,30.

This observation recognizes that the nascent Palestinian encompassed a mixed bag of laws and military orders from previous governments, which would prove problematic for the effective governing of a state. Shehadeh goes on to note that further stipulations in the law did not transfer the correlating management of budgetary decisions to the Palestinians for these "powers and responsibilities" due to security reasons.[91] The status of many Palestinian laws, therefore, can be tenuous at best or confusing not only for those who study them, but also those who are supposed to implement and obey them.

In 1994, the Israeli government began the process of withdrawing both civil supervision and security forces from the areas of Jericho and the Gaza Strip as a step toward a more complete peace agreement and transfer of authority. Eventually this led to the creation of three distinct classifications of Palestinian land in the West Bank. Jericho became an "Area A" municipality in which the Palestinian Authority (PA) is responsible for both civil administration and security. Under Area B the PA controls only civil affairs and Israel deals with security. Area C remains under complete Israeli security and civil jurisdiction. (see Table 2.1) Figure 2.1 provides a map of the classification of land into area A, B, and C in the West Bank.

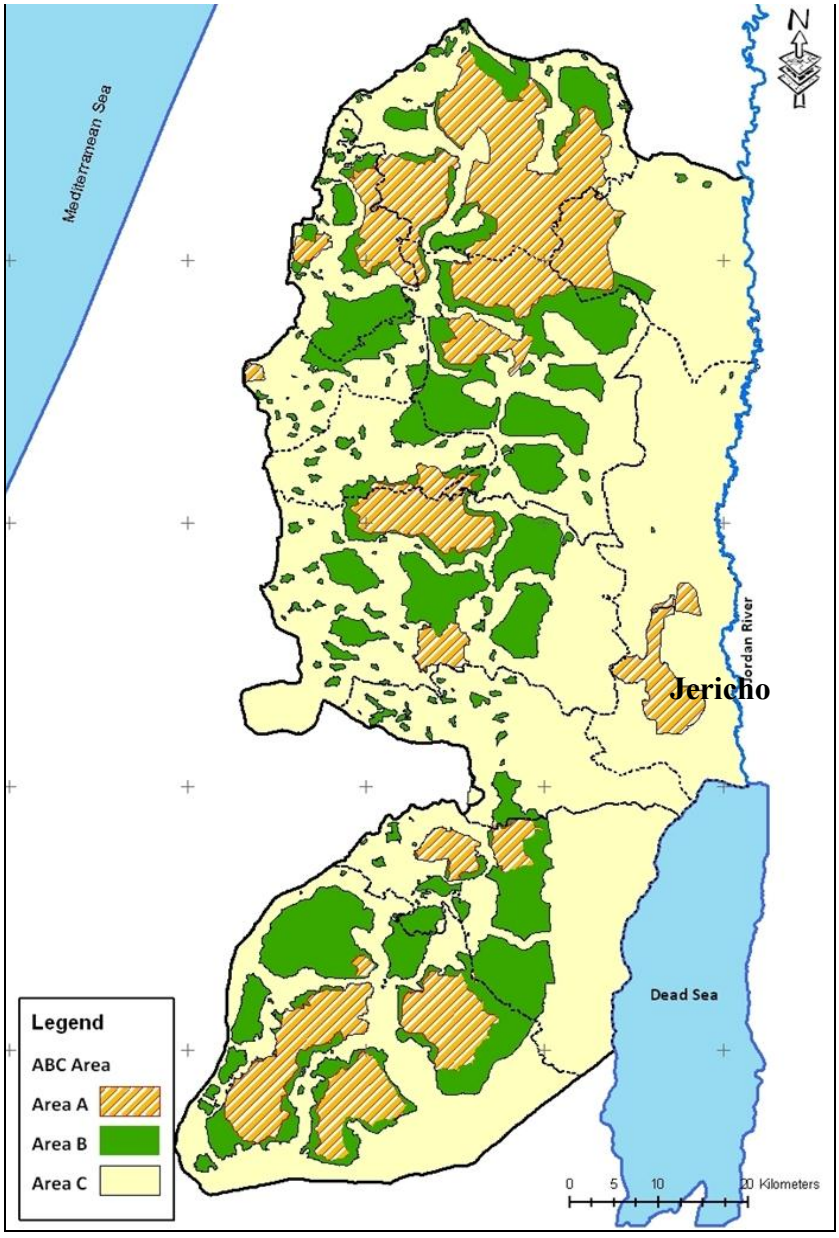
[91] Shehadeh, 30.

Table 2.1 Classification of Land Under "Oslo 2" Accords

	Civil Authority	**Security Authority**	**Example Cities**
Area A	Palestinian	Palestinian	Jericho, Bethlehem, Ramallah, Hebron
Area B	Palestinian	Israeli	Abu Dis and Sawahera
Area C	Israeli	Israeli	All Israeli settlements in the West Bank

Since 1994, Jericho has been self-governed, in at least theory, and should therefore may serve as an example for future Palestinian administration and management of water resources. However, theory contrasts with practice in important ways. While nominally a Palestinian controlled municipality, Jericho still operates within a larger system of occupation, and therefore faces many of the same constraints of more formally controlled areas. For example, unlike a municipality of similar size operating within Israel, Jericho faces considerable challenges including the lack of a reliable transportation infrastructure or public revenue streams.

Figure 2.1 Land Classification according to Oslo Agreement



Source: *Palestinian Hydrology Group*.
"Geopolitical Maps." <http://www.phg.org/maps.asp?map=7>

The Oslo Accords set out only the most basic framework for future negotiations between Israel and the Palestinians, as then represented by the Palestinian Liberation

Organization. The original agreement was intended only as an interim set of negotiations lasting for five years, after which there would be a reconsideration of several of the main issues of contention between Israel and Palestine, one of which was the question of water rights.[92] However, the peace process as a whole has stalled. What was intended originally as an interim agreement continues to be the de facto framework guiding many joint issues between Israel and the West Bank, including water allocation.

Details for the specific transfer from Israeli to Palestinian civil and security control in designated areas were laid out a year later in the Gaza- Jericho Agreement. This Agreement details the transition of security arrangements, civil affairs, legal matters and economic relations in the city of Jericho and the Gaza Strip.[93] Annex II of the agreement dealt specifically with the transfer of civil operations, and included relevant provisions including: agriculture, land registration, nature reserves, public works, water and sewage, planning/ zoning and environmental protection. The section on water and sewage states that all water systems and resources in Jericho and Gaza, with the important exception of existing Israeli settlements and Israeli military zones, would be transferred to the management of the Palestinian Authority for maintenance and development.[94] The first part of the section lays out the framework for a "Joint Civil Affairs Coordination and Cooperation Committee" and recommends the creation of

[92] "Brief Report on the Water Sector Reform" The Palestinian Water Authority. The Palestinian National Authority. Mar., 2011, 10.
[93] http://www.mfa.gov.il/mfa/peace%20process/reference%20documents/
[94] Gaza- Jericho Agreement, Annex II, Article II, B, 31. http://www.mfa.gov.il/MFA/Peace+Process/Guide+to+the+Peace+Process/Gaza-Jericho+Agreement+Annex+II.htm

similar subcommittees to address the transition and coordination of services between the two authorities.

The Water and Sewage section includes a specific recommendation that "the two Parties shall establish a subcommittee to deal with all issues of mutual interest including the exchange of all data relevant to the management and operation of the water resources and systems and mutual prevention of harm to water resources."[95] This recommendation has led to the creation of the Joint Water Commission (JWC) that includes representatives from both Palestinian and Israeli water sectors. New water projects in the West Bank require the approval of the JWC, which can be a lengthy and complicated procedure at best. The frustration with this institution, viewed by Palestinians working in the water sector as an ineffective and inequitable establishment, is palpable.[96] Projects that are planned within Area C regions require the additional permission of the Israeli Civil Authority. Jericho, as an Area A municipality, is spared this additional level of bureaucracy.

While some analysts hailed the Oslo Agreements as constructive steps in the peace process, critics claim that these agreements changed little in the status quo and had only superficial consequences. For example, Jan Selby specifically addresses water management within the Oslo framework and challenges the widely accepted narrative that Oslo I and II made significant gains for both sides that were subsequently lost with

[95] Gaza- Jericho Agreement. *Israel Ministry of Foreign Affairs.* Annex II, Article II, B, 31, h.

[96] These inferences were gained from personal interviews with Palestinian experts and scholars who deal with the issue: Dr. Ziad Qanam of Al Quds University, 14 June 2011; Dr. Abdul Rahman Tamimi of the Palestinian Hydrology Group, 14 June 2011; Dr. Jad Isaac, of the Applied Research Institute Jerusalem, 15 June 2011; Nader Khatib, the Palestinian Director of Friends of the Earth Middle East, 15 June 2011; and Dr. Alfred Abed Rabbo of Bethlehem University.

the Intifada of 2000. Selby argues that the Accords simply perpetuated Israeli Occupation and domination of Palestinian resources under a different name, and that management of resources by Israeli and Palestinian institutions have been largely unchanged despite Oslo.[97] He does, however, recognize that even the illusion of progress significantly increased the amount of foreign aid and investment coming to the Palestinian territories, specifically to the West Bank. This foreign assistance spurred by the Oslo Accords decreased the burden on Israeli resources and encouraged development in the West Bank: "The Oslo agreements and process as a whole bestowed a new-found legitimacy on Israeli-Palestinian relations (or at least signaled a gradual move towards legitimation of these relations, the 'peace process')."[98] While this aid comes with its own challenges, which will be discussed in more detail later, Oslo impacted the water sector within the West Bank and Jericho, even though it may be difficult to precisely quantify that effect.

Institutions in Jericho

The Palestinian National Authority (PNA) established the Palestinian Water Authority (PWA) in 1995. The Water Law No. 2 stipulates that the PWA is to be an independent governmental organization that reports directly to the President of the PNA.[99] Water Law 2 was revised in 2002, as Water Law No 3 declares all water resources, including waste water, public Palestinian property and therefore under the

[97] Selby, Jan. *Domination as Cooperation*. p 124.
[98] Selby, 138.
[99] "Brief Report on the Water Sector Reform." The Palestinian Water Authority. *The Palestinian National Authority*. (Mar. 2011), 11.

protection of PWA.[100] The PWA nominally has the duty to protect and oversee water resources, but lacks the people or procedures to manage water sectors on the ground. Instead, this responsibility was delegated to the "Local Authorities" via the Local Authorities Law No. 1.[101] Therefore, local water management operates under a vague legal and political framework; for example, some "Local Authorities" include non governmental rather than official actors.[102] This dynamic is important, because the framework for water management can be unique within each Palestinian municipality, and can include non-governmental organizations (NGO's), often categorized as environmental nongovernmental organizations (eNGO's). Whereas eNGO's in Israel focus largely on research and advocacy, their Palestinian counterparts often are the institutions providing services and resources to the population en lieu of effective governmental institutions.

Power to control the water within at the municipal level in Jericho is manifest in several different groups, governmental and nongovernmental, within Jericho's society that wield considerable sociopolitical and economic influence in the town and its water sector. Trottier uses Jericho and the control of the Ein Sultan spring water as an example of the dichotomous tension between the traditional landed elite and new elite made up of the increasingly large population that worked outside of the agricultural sector. With a population boom in the late nineties, the farmers were still receiving the same "hours" of

[100] ibid
[101] ibid.
[102] ibid.

water, but the *quantity* had decreased significantly.[103] As a result of this tension, the farmers bonded together to create the "Ein Sultan Water Users' Association" (ESWUA).[104] The agreement stipulates that farmers are entitled to fifty-eight percent of Ein Sultan's output and domestic users are allotted forty-two percent.[105] This agreement has not been modified since its creation, despite the fact that the municipality's demands have "forced" providers to informally increase the domestic consumption ratio.[106] Due to the political connections of its members, the ESWUA gained permission by decree in 1998 to be the provider and regulator of Jericho's domestic and irrigation needs. The following year, the municipality announced that it did not recognize the validity of the ESWUA's decree.[107] This tension between the farmers who still exercise considerable amount of power through the ESWUA and the nascent formal governing institutions of the PA continues to be problematic today.

Demographic Information about Jericho under the PA

As of the official 2006 census, Jericho has the smallest population of any Palestinian governorate, with just over 43,000 residents.[108] In contrast, the next populous governorate, Tubas had just over 48,000 residents, and the most populous governorate of Hebron contained about 543,000 residents.[109] These numbers reflect each governate as a

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[103] Trottier, Julie. "Allocating and Managing Ware for a Sustainable Future: Lessons Around the World." Natural Resources Law Center. University of Colorado School of Law. June 2002. 11.
[104] ibid
[105] Palestinian Hydrology Group. *Draft Master Plan*. "4.1 Current Domestic Water Supply and Use." 24.
[106] Bsharat, Jalal. *Personal Interview.*
[107] Trottier, "Allocating and Managing Ware for a Sustainable Future," 12.
[108] Palestinian Central Bureau of Statistics (PCBS) Official Census. 2006.
[109] PCBS, 2006

whole, and the governate of Jericho contains an additional eleven other localities, ten considered "rural," one (in addition to Jericho itself) considered "urban," and two refugee camps. Although there has not been a formal census since 2006, estimations calculated by the Palestinian Central Bureau of Statistics (PCBS) for the *city* of Jericho itself are projected to now be in the range of 20,000, whereas population for the *governate* is estimated to be around 48,000.[110] It is important to keep these population differences in mind when attempting to extrapolate information about Jericho to the broader Palestinian situation. While Jericho is a useful case study because of its Area A status and its relative wealth in terms of water resources, its small size still makes it unique.

When dividing the total domestic use with the population connected to the network, the per capita domestic consumption within Jericho is actually markedly higher than in the rest of the West Bank. Whereas the master plan shows that per capita consumption in Jericho calculates to be approximately 292 liters per capita per day (l/c/d), the norm in the greater West Bank is a low 70 l/c/d.[111] When estimating per-capita water consumption, the Palestinian Hydrology Group (PHG) also had to consider the water volume used for "conspicuous consumption" including the amount used from the domestic connection for such relative luxuries as: irrigation of household gardens, swimming pools, and cooling systems. The PHG report, however, is careful not to point blame for the high domestic consumption solely on patterns of use of the populace:

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[110] "Localities in Jericho & Al Aghwar Governorate by Type of Locality and Population Estimates, 2007-2016." *Palestinian Central Bureau of Statistics*

[111] PHG, *Draft Master Plan*. 4.1 "Current Domestic Water Supply and Use." 27.

> For the sake of objectivity, these water practices cannot merely entirely be considered as reckless behavior since the extremely elevated temperatures do in fact require much higher use of water to sustain a healthy life.[112]

Despite its plentiful water sources, the Jordan River Basin is also an extremely hot location in which to live. Jericho is located about 400 meters below sea level and mean summer highs are around 37.6 ˚C (100 ºF).

After excluding swimming pools and other elements of conspicuous consumption from the equation, the PHG revised down its per capita domestic consumption estimates to be closer along the lines of 134 l/c/d.[113] The decision to make this revision is questionable, given that total domestic consumption usually does include all of the extraneous sources of domestic water consumption that go beyond fulfilling the most basic of needs. Even after the seemingly arbitrary exclusion of certain uses, the remaining consumption is still almost twice as high as elsewhere in the West Bank. At this time, the Municipality of Jericho and the PHG lack the resources to effectively map out water consumption more specifically so as to determine how domestic consumption patterns differ between individual consumers from various socioeconomic subsets of the population.

Economy of Jericho

As is the case for many towns in the region with Biblical importance, tourism remains a main source of income in Jericho. A short driving distance away from the Dead Sea, Jericho also hopes to further develop its domestic and international tourism

[112] PHG, *Draft Master Plan*. 50.
[113] ibid

industry through the marketing of this Dead Sea connection as well as proposed ecotourism around the Jordan River Basin.[114] The number of tourists in the city has climbed markedly in the past several years, despite a decrease in overnight stays caused by increased Israeli checkpoints and difficulty crossing the borders.[115] A telling sample shows that from the month of February in 2009 to the same month in the following year, the number of visitors in Jericho climbed dramatically from approximately eighty thousand visitors to one hundred and fifty thousand.[116] The Municipality of Jericho hopes to encourage this increasing trend of tourism in the future.

Despite a few good years for tourism, it is difficul to extrapolate conclusions about the future of the tourism sector for Jericho. Political instability in the region, and the unpredictablity of future unrest mean that tourism in Jericho is a highly volatile industry for individual tourists, investors and officials alike. Regardless of the volatility of the industry, officials within Jericho still focus on its potential to bring increased economic activity into the region. This focus on the expansion of the tourism industry represents not only a major development opportunity for the municipality, but also a serious challenge. Tourists, especially international tourists hailing from first-world countries, are more likely to consume a greater amount of water per capita, and managing this increase will undoubtedly put a great stain on the existing framwork for allocation.

Agriculture represents the largest single consumer of water in the West Bank, especially within the areas surrounding Jericho. Whereas agriculture in Israel is highly

[114] Draft Master Plan 2.3 *Population and Socioconomic Condition*. 13.
[115] B'Tselem. Dispossession and Exploitation. "Restrictions on Tourism in Jericho." 64-65.
[116] Draft Master Plan 2.3 *Population and Socioconomic Condition*.14.

mechanized, and "high-tech," agriculture in the West Bank remains largely subsistence farming. Although the GDP related to agriculture is comprably small in both areas (2.4% of Israel's GDP and 3.7% of the West Bank's), the percentage of the labor force employed by the industry is significantly greater in the West Bank, in which an official twelve percent of the population is engaged in agriculture.[117] This twelve percent likely does not take into consideration the number of women and children who work unofficially in household economies by assisting with domestic agriculture. In Jericho specifically, agriculture involves not only those who rely upon it for the entirety of their income, but also many who have small scale garderns or other jobs in order to make a living. For example, a recent survey reported that 38.5 percent of the farmers in Jericho surveyed by the PHG said that they rely on the private sector for their main source of income.[118]

Other sectors of the economy are increasingly becoming more important in Jericho, but agriculture nonetheless consumes the most water. Although Jericho is in the running for the creation of an "industrial" zone, no such developments have yet been achieved.[119] It is the largest of the governates in size, and has many resources to offer, but its small and largely rural population inherently favor agricultural economic activities to industrial. Because other aspects of Jericho's economy are not as well developed as the agricultural sector, there is no existing data on the breakdown of use by sector at this time.

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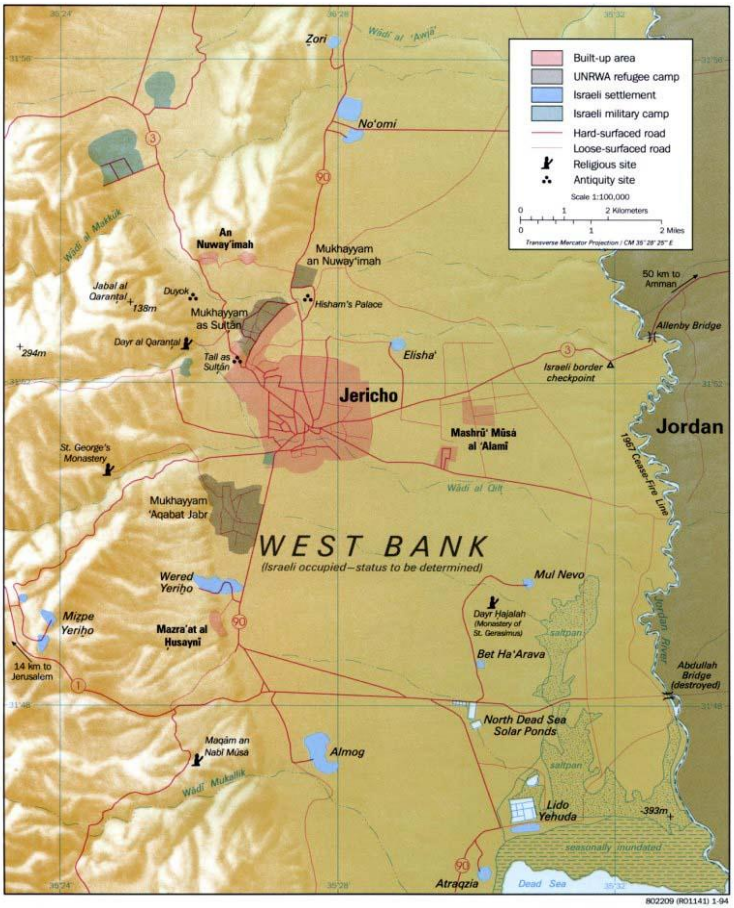
[117] CIA World Factbook entries for the West Bank, and Israel
[118] PHG, *Draft Master Plan.* "Population and Socio-Economic Conditions."17.
[119] ibid, 15.

Jericho and its neighboring Refugee Camps

Another complicated demand for water comes from the two refugee camps near Jericho, the Ein Sultan Refugee Camp, located northwest of the city and the Aqbat Jabr Camp, located to the south. Figure 2.2 illustrates the location of the two refugee camps relative to the city of Jericho.

Figure 2.2 Ein Sultan and Aqbat Jabr Refugee Camps (*Mukhayyam*)



Source: UT Library Map Collection. "Jericho and Vicinity."

While the Ein Sultan Refugee Camp pumps directly from the spring, it is actually not under the jurisdiction of the municipality of Jericho. Instead, the United Nations Relief

and Works Agency for Palestinian Refugees (UNWRA) administers water for the over 1,900 refugees within the camp.[120] All of the households within the camp are connected to a water network; however, water shortages, especially during the summer months, remain a primary challenge for the camp and its inhabitants.[121]

Ein Sultan Refugee Camp pumps water from the spring *before* it enters the network, but the Aqbat Jabr Refugee Camp receives water via the Southern water tank within the domestic network. The amount that the camp receives from the municipality falls far short of what is needed for the 6,400 refugees who live there. Although in 2009, the camp *should* have received about 500 m^3/ day, it was actually receiving a mere 127 m^3/ day, according to the PHG. The UNWRA notes this among other problems when detailing of the current situation of water allocation and shortages within the camp:

> "While all shelters are connected to public water and electricity infrastructure, water scarcity is a major problem in this desert area. During the summer months, residents face severe water shortages which cause tremendous hardship. UNRWA is able to provide some water to the camp by pumping it from a nearby spring, though the Israeli water company Mekerot is the main supplier of water to the camp. There is no storm water drainage, and during heavy rains, water floods residents' homes."[122]

The situation of Aqbat Jaber and its relationship with the Municipality of Jericho are emblematic of a larger problem across the spectrum of Palestinian society. Navigating who is responsible for the allocation of water within these ambiguous communities that are at once controlled by the international community and no one at all will continue to be a challenge for Palestinian self-governance in the foreseeable future.

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[120] UNRWA, "Ein el Sultan Refugee Camp." <http://www.unrwa.org/etemplate.php?id=114>.
[121] ibid
[122] UNRWA, "Aqbat Jaber Refugee Camp." <http://www.unrwa.org/etemplate.php?id=106>.

Jericho as compared with other models of water allocation in the West Bank

It is useful to compare the situation for allocation within Jericho and that of several other towns of the West Bank in order to more fully understand some general trends of water allocation and where Jericho fits in this framework. Julie Trottier addresses the key challenges and pressures of equitable and efficient water allocation in the West Bank by examining two villages with significantly different water sharing structures, specifically focusing on the different interactions and decisions regarding their relationship with the established Israeli water infrastructure. Jericho's system shares characteristics with each of the two examples, but also represents a unique framework because of its location, resources, history, and politics. This level of institutional uniqueness and local specificity exists among the towns and cities within the West Bank, and therefore need to be considered more closely when attempting to manage water allocation within the region.

The village of Marmayya, located near Jerusalem, relies on six springs, all of which (at the time of Trottier's field research in 1999) were controlled through a complex informal social network. In a common means of traditional water sharing in Palestine, each of the eight main tribes had access to the water sources on a rotating basis and divided the water internally between members of their family unit or tribe.[123] Although the village was connected in 1972 to the Israeli water company, Mekorot, control over the sources has remained much the same and the village has maintained a substantial degree

[123] Trottier, Julie. "Water and the Challenge of Palestinian Institution Building." *Journal of Palestine Studies*. 29.2 (Winter, 2000), 37.

of autonomy.[124] The village of Falamiah, in the northern West Bank relied on rain-fed agriculture and small individual cisterns until the late 1950's, when wells were first drilled, an event that changed the political capital and social organization within the village.[125] Those who could afford to fund the drilling of a well subsequently controlled access to it, and those who could not were directly vulnerable to the whims of the price hikes of the owner.[126] Jericho relies much more on its spring, like the first example; however, the municipality has only been tangentially connected to Israeli water lines.

Through these two examples, Trottier highlights two contrasting trends concerning the allocation of water in the West Bank. On one hand, there is a trend toward decentralization, or as Trottier puts it "centrifugation," in which changing methods of allocation and division of responsibility empowers actors *other* than the Palestinian state. On the other hand, an opposite trend, or "centripetal dynamic," as Trottier terms it, also occurs when the changing paradigms favor increased centralization and greater power of the PWA and by extension the PA in general. Jericho has experienced elements of both decentralization and centralization, and that these competing forces prove to be a major stumbling block for the development of water management in the city today. The traditional landed elite, as manifest within the ESWUA, is a decentralized force in Jericho representing the concerns of agriculture at the cost of domestic and commercial development. Ongoing efforts of the Municipality of Jericho to centralize and normalize their control over water allocation of the city have

[124] ibid, 39-40
[125] ibid, 40.
[126] Trottier, *Institutions*. 40.

been hindered by the traditional decentralized powers. The tension between these forces will be examined in more detail within the next chapter and the conclusion.

Chapter Three

Analysis of Jericho's System of Water Allocation

With this socioeconomic and political background of Jericho established, this report now examines the specific framework for water allocation within the municipality and the challenges that impede successful development. Although Ein Sultan provides enough water for the entire city, how it is actually delivered to the city is complex and problematic. The waters of Ein Sultan are divided between the main domestic network and irrigation pipelines, traveling generally north-south and west-east across the entire city. However, the allocation is more complex, as inefficiencies are prevalent and real consumption patterns differ from officially recognized allowances. This section relies heavily on the Master Plan for Jericho organized by the Palestinian Hydrology Group (PHG), which is the first and only attempt to create a comprehensive overview of the water sector in Jericho, its problems and possible solutions.[127] The findings and suggestions of the plan are examined under the framework of past successes and failures in the city's long history as well as the sociopolitical and economic condition of Jericho today.

[127] Note- much of the information here comes from a draft of that plan received 25 October 2011, (Referenced as the "Draft Master Plan") and has been updated as more complete information has become available, as the Plan has moved from one phase to another during the time span of this thesis

Methodology of Jericho's Master Plan

The draft master plan for Jericho was created with the cooperation of various organizations, especially the Palestinian Hydrology Group and a cooperative partnership with the municipality of Paris. The stated goals of the project are:

> reinforcing water production and distribution capacities and modes, reinforcing the water Department's municipal management capacities, assisting the Municipality in implementing a public-awareness campaign for more rational water use, and assisting a local water governance reform process.[128]

The goals of the Master Plan reflect the ambitions of the broader Palestinian water sector, but its recommendations are also limited in scope because of limitations such as funding, which are detailed later.

Prior to the study in 2011, there had not even been a comprehensive map of Jericho's water users or patterns of use. The Master Plan was the first time geographic information systems (GIS) had been used for the city to measure and plot data points to effectively visualize the system as a whole. The municipality of Jericho lacked a hydraulic model of the city and therefore could not effectively plan any new projects or determine how changes might affect the system as a whole. Hydraulic models are used mainly in measuring use, determining how possible changes will affect the system by measuring it on a small scale. Before the Master Plan, the water engineers could only measure consumption of major users in the city and then would have to approximately divide the remaining consumption among the number of domestic users. A main success of the Plan has been to establish better mechanisms and tools for future planning projects.

[128] PHG *Draft Master Plan*. 1.2 p, 5.

Funds from the Municipality of Paris to build a hydraulic model for Jericho will enable engineers in the future to measure the impact of changes and map problems more efficiently. This will have positive impacts for not only the maintenance and improvements for the current system, but also create a better atmosphere for urban planning in the future as well.

The plan, considered three categories of water consumers: households, agriculture, and industry. The PHG collected household questionnaires from a random six percent of the households within Jericho city limits. Fifty-thee additional surveys were returned by farmers and thirty-three by industrial consumers.[129] If the plan is successful in its endeavour, then it could serve as a model by which other municipalities can draw upon, especially in the wake of any future transfer of power from Israel to the Palestinian Authority. However, it is important to note that this draft has only come to fruition after nearly two decades of independent Palestinian jurisdiction in the municipality. The Master Plan for Jericho is the third such project undertaken by the PHG; hopefully, it will be promoted as an example for future Palestinian surveys.

The report also relies upon demographic information from the Palestinian Central Bureau of Statistics. As is the case throughout the Middle East, the population within Jericho consists largely of youth, with approximately forty percent of the population fourteen years and younger.[130] Refugees make up forty-three percent of the city's total

[129] PHG. *Draft Master Plan*, 1.3.4, p 6. *the report does not indicate what percentage of total regional industry and agriculture these numbers represent.
[130] JDMP. section 2.3 *Population and Socioeconomic Conditions*, 12.

population.[131] These two sectors of the population alone indicate a highly volatile social environment, in which inequities and the lack of basic necessities, such as water, are apt to be felt especially strongly.

Supply and Demand of Water in Jericho

Located in the comparatively water-rich Jordan Valley, the governate of Jericho has the highest average available water supply in the West Bank with access to approximately 3.61 million cubic meters (MCM) per year and a measured demand of about 2.36 MCM/ year.[132] Whereas territories further south face significant shortages, Jericho is one of the few areas in the West Bank operating with what appears to be an adequate, even surplus, supply to meet its demands. Despite its comparatively large quantity of water, Jericho still faces the challenges of providing an efficient framework to supply all residents with adequate and high *quality* water. The challenge of transporting the water to consumers, dividing it in a fair and economically sound manner, and planning for growth and development of the city are nonetheless serious concerns for a municipality and water sector working with limited resources.

Jericho has the highest per capita water consumption within the West Bank, of 174 liters per capita per day (L/c/d), and it is the only governate in which the water consumption is above the World Heath Organization's (WHO) Minimum Water Standard of 100 L/c/d. [133] The reasons for this high level of consumption reflect the available sources, the small population, and the hot climate. In addition to Ein Sultan and other

[131] ibid
[132] PWA, Jericho Governate report.115
[133] PHG, Water for Life, 2006, 29.

springs in the region, there are also both shallow and deep aquifers in the Jordan Rift Valley, which can be accessed via wells and supply additional water for the area. The output from such wells, however, is more difficult to quantify, as fluctuations in output can vary dependent upon variables such as season, the rate of recharge, weather patterns, and the rate of extraction. Because all major aquifers in the West Bank cross the Green Line with Israel, drilling of wells is a highly charged political subject. Although Jericho does not rely primarily on water extracted from wells like other cities, the challenges of drilling and rehabilitating wells remains an obstacle.

Management of Water Allocation within Jericho

The maintenance and upkeep of the physical systems of allocation and distribution fall under the jurisdiction of the Municipality of Jericho's Services Department, which includes seven sections, only three of which are directly related to the water sector: Water Networks Maintenance, Domestic Water and Irrigation Water. Two other sections of the Department are tangentially related ("Gardening" and "Health and Environment"); however, the PHG considers them outside the scope of their study, and the PHG report did not demonstrate their duties or attributes. There is hypothetically a public awareness division within the "Domestic Water and Irrigation Water" section; however, this section has no employees, demonstrating the priorities of the municipality operating with constrained funds. [134] Jericho and other parts of the West Bank are busy

[134] PHG. *Draft Master Plan*. "The Status of the Existing Water Supply System." 30.

grappling with immediate and tangible water-related challenges, and public awareness campaigns are put on the "back burner" when there are limited funds.

Other problems inherent in the organization of the system include the lack of an employee to specifically control the irrigation schedule.[135] As will be further detailed below, the irrigation network suffers from a plethora of problems, not least among them is the inability to properly coordinate use and timing of irrigation water to individual customers across varying supply lines. There appears to be little coordination across the system with other members of the government, a challenge within any bureaucracy, but especially so for a fledgling government struggling with resource management. At the level of physical maintenance and upkeep of the network, there is also a paucity of technical expertise and manpower to sufficiently maintain the many pumps that are needed to keep water moving throughout the entire system.[136] These problems ultimately reflect the immediate priorities of a department operating in a municipality with severely restricted funds. With sufficient funds these vacant or understaffed positions could be filled and individuals trained.

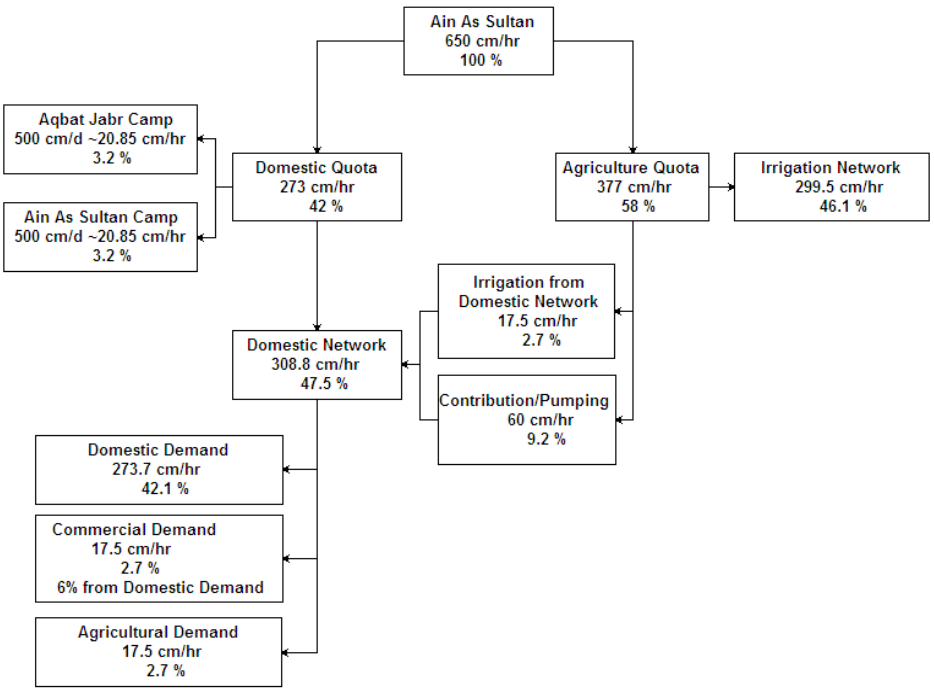
The Situation of Domestic Allocation

According to an agreement between the Municipality of Jericho and the Ein Sultan Irrigation Society, the distribution of Ein Sultan's water is to be specifically allocated as follows: forty-two percent for the domestic sector and fifty-eight percent for

[135] ibid
[136] PHG. *Draft Master Plan*. "The Status of the Existing Water Supply System." 30.

the agricultural sector. [137] The context for this sharing arrangement and the pressure exerted by the Ein Sultan Water Users' Association (ESWUA) was detailed in the previous chapter. Although its name implies that it represents all users of the spring's water, agricultural interests still dominate the ESWUA. The PHG reported was that of the total 650 m^3/h flow of Ein Sultan, the amount currently allocated for irrigation is 299.5 m^3/h, leaving a remaining 350.5 m^3/h for domestic consumption. Subtracted from that amount is the approximately 20.8 m^3/h used by the Ein Sultan Refugee Camp, before the water from the spring even enters the network. Therefore, the total quota remaining for domestic use of Jericho is 329.7 m^3/h.[138]

Figure 3.1 Division of the Waters of Ein Sultan (Referenced here as Ain As Sultan)



[137] PHG *Draft Master Plan*, 4.1 Current Domestic Water Supply and Use, 24.
[138] PHG *Draft Master Plan*, 2.0 Technical Assessment of Distribution Systems, 30.

Source: Palestinian Hydrology Group, *Draft Master Plan*, p 30.

The distinction between domestic and agricultural allocation is less of a clear line than the initial agreement might at first appear. Only some of the agricultural quota is received through the irrigation network, with the rest being satisfied through the domestic supply line. The domestic network is comprised of nine main domestic pipelines which total about 156 kilometers in combined length. The smallest of these pipes are only half an inch in diameter, whereas the largest are sixteen inches in diameter.[139] Compared with massive pipelines that connect main lines in Israel and elsewhere, even the largest of these domestic pipes is small in comparison, demonstrating the truly local nature of the system as a whole. However, the small scale of the pipelines corresponds with the small size of the community, which lacks the infrastructure to maintain even such a small-scale operation.

Measuring water passing through the pipes as well as water utilized by individual consumers is essential to efficiently manage the operation of the system as a whole and to equitably charge consumers for their services. There are two types of meters used to measure water used in domestic connections, those that measure water by volume (i.e. volumetric meters) and those that measure it use by velocity. At the time of the PHG's survey, there were 4,597 individual house connections, the large majority of which (about 83%) employed velocity water meters. Measuring consumption by the rate at which water flows is inefficient because it often does not reflect real use. In other Palestinian cities in the West Bank, such as Bethlehem and Abu Dis, the problem of efficient

[139] PHG *Draft Master Plan*, 3.1 "The Structure of the Domestic Water Distribution System." 37.

measuring is perceived as especially problematic when consumers are charged for time rather than by volume. In this system, households can be charged for goods that they are not even receiving, often due to seasonal water shortages.[140]

The large number of pumps needed to operate Jericho's domestic network, greatly increase the cost of running the system as a whole because of the price of fuel and labor needed to maintain these outdated, inefficient pumps. Because of the inefficiencies in the operation of the system as a whole, these pumps are often running at much higher than their intended capacity, thereby further increasing their running costs while decreasing their running lifetime.[141] A report from the Palestinian Water Authority (PWA) notes that despite Jericho's high consumption rate and access to significantly more water resources, the governate still suffers from a twenty percent "Unaccounted for Water" (UFW) in the system.[142] This means that the difference between the amount of water that enters the distribution system is 120 percent greater than the volume that is billed to the consumer, because of the leaks, pressure issues and other inefficiencies in the system.

Irrigation Lines and Agricultural Allocation

The agreed upon quota for agricultural use of fifty-eight percent of Ein Sultan's total 650 m^3/h output totals 377 m^3/h. The PHG has measured that of this quota, 17.5 m^3/h of that water actually originated from the domestic water network. The remaining amount is channeled through the four primary irrigation lines in the city referred to as A, B, C and D, running roughly west to east and southeast. The lines are approximately

[140] Qannam, Ziad. *Personal Interview*. 14 June 2011. Al Quds University.
[141] PHG, *Draft Master Plan*. 3.2 "The Performance of the Domestic Water Distribution System." 39.
[142] "Basic Needs and Development: Ongoing and Proposed Projects by Governorates." *PWA*. 113

thirty-five kilometers long, spanning most of the city and surrounding agricultural areas.[143] An additional sixty m^3/h is subtracted from the total irrigation quota in order to cover the cost of pumping, therefore leaving a total just under 300 m^3/h to be divided, in theory, between the four main pipelines.[144] The water that flows in the pipelines of the irrigation network have minimal treatment and flow from the main network lines directly to the farmers who can pay for the amount of minutes they would like to purchase and individual hydrometers measure the amount that each pumps. The system as a whole is unsatisfactory for both providers and consumers, given its poor construction and overall level of inefficiency.

Just as the inefficiency of the pumps are a main problem in the domestic network, maintaining adequate water pressure is also a primary challenge for the irrigation lines. The water from Ein Sultan is pumped directly into the irrigation network with little pressure behind it and aversely affects the pressure of the entire system. Hydrometers and flow meters installed throughout the system in order to ensure that farmers received the quotas that they paid for were calibrated only to operate *above* a certain level of pressure (3 bar) within the pipelines. PHG found that a strikingly high percentage of these hydrometers were operating below this minimum and therefore not effectively measuring or distributing quotas as they had been designed.[145] Farmers, therefore, run the risk of paying for water that they are not receiving because the system is measured by time, and the operators are unable to ascertain how well the system is operating.

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[143] Palestinian Hydrology Group. *Draft Master Plan*, 32.
[144] PHG *Draft Master Plan*, 2.0 Technical Assessment of Distribution Systems, 30.
[145] PHG, *Jericho Draft Master Plan*. 2.2 "The Performance of Water Distribution Systems.", 34.

The "EPANET" model used by the Jericho Municipality (see note) in order to measure the performance of the piping system, sets a higher quantity than can be tolerated given the quotas outline previously.[146] While the quota is set at 299.5 m^3/h among the four irrigation lines, the total quantity for the model presently being used by the municipality is 400 m^3/h[147], much higher than can be sustainable or effectively provided by the spring. However, if the total quantity were to be reduced to a more sustainable level, then the number of hydrometers operating at pressure levels below their designed optimum capacity would skyrocket from 63 to 262, further decreasing the effectiveness of the network as a whole.[148] These problems would mainly manifest in the lines C and D, which are located farther south than the other two, and therefore also a longer distance from the initial pumping from Ein Sultan into the network.

The system also suffers from a number of sub-par operational conditions, such as the lack of adequate water treatment, which subsequently makes it difficult for the pumps and meters to operate as they should, costing the city much money.[149] Pipes are only designed to operate with a limited amount of particles in the water they transport. The inadequate treatment, especially within the irrigation network contains so much sediment that it damages the infrastructure of the network. This poor water quality poses not only

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[146] This model is described on its website: "Developed by EPA's Water Supply and Water Resources Division, EPANET is software that models water distribution piping systems. It is a Windows 95/98/NT/XP program that performs extended-period simulation of the hydraulic and water quality behavior within pressurized pipe networks." EPANET "Software That Models the Hydraulic and Water Quality Behavior of Water Distribution Piping Systems." < http://www.epa.gov/nrmrl/wswrd/dw/epanet.html>.

[147] PHG, *Jericho Draft Master Plan*. 2.2 "The Performance of Water Distribution Systems.", 35.

[148] ibid

[149] PHG, *Draft Master Plan*. 36

health and environmental risks, but also compromises the physical integrity of the pipelines. These conundrums are emblematic of the problems of the system as a whole. Designed to operate a certain way, and forced to work in different ways because of systematic limitations, the technical aspects of the system last even less than they were designed.

Because water minutes can be independently owned and sold by those who "own" them, transactions often happen in which an owner, located on one pipeline sells his time to a farmer, on a completely different line. These independently conducted transactions make it difficult, if not impossible, to monitor and predict long-term use on each line and the hydraulic impacts of that use.[150] The location of a farmer can impact the amount of water they are able to receive from the irrigation network. To a certain extent, this is to be expected. Those farmers at higher elevations, generally to the southern parts of Jericho, receive lesser quality water than those at lower elevations because of the problems with the pressure of the system.[151] However, if a farmer further down the network is paying the same price for a given amount of minutes as a farmer closer to the source, he can effectively be paying more for less. Disparities in ability to receive water depending on location is not, on its own, a problem; however, the failure of pricing systems to account for this difference has the potential to create real problems in the sector and the city as a whole.

[150] PHG, Jericho Draft Master Plan. 36.
[151] PHG, Jericho Draft Master Plan. 36.

Quality and Wastewater Problems

Jericho represents another often-overlooked aspect of water distribution in the Palestinian territories: quality. The constant battle in the West Bank over questions of quantity means that the quality of water is often disregarded. Although Jericho has an undisputedly higher quantity available than other areas, the quality of that water still leaves much to be desired and has serious negative impacts on not only the environment but also the health of the general population. The Water, Sanitation and Hygiene Monitoring Program (WaSH MP) of the Palestinian Hydrology group uses Jericho as the most prevalent example of wastewater mismanagement that plagues the entire West Bank and Occupied Palestinian Territories as a whole:

> The least developed governorate in regards to wastewater coverage in the West Bank is Jericho where the local population has no wastewater network coverage. It relies solely on cesspits and septic tanks. This is primarily due to the fact that historically development of a wastewater disposal network in the West Bank has occurred only in the largest urban centers. In addition to the relatively small size of Jericho (43,620 inhabitants), the city's geographic isolation has left it with limited services.[152]

This report is several years old, but significant improvements in the wastewater system have yet to be made. The Master Plan proposed the development of a wasterwater treatment plant in Jericho, but the start date for this *planned* project is not until 2015.[153] In the meantime, the residents of Jericho will continue to live without adequate wastewater facilities. Wastewater treatment and reuse of "gray" water is a main source of water use, especially within the agricultural sector in Israel. An efficient wasterwater

[152] Water for Life, 2006, 33.
[153] PHG, Jericho Water Master Plan, powerpoint presentation, slide 35.

treatment plant and gray water re-use plan could greatly increase Jericho's options for planning its allocation and the possibilities for redistributing the Ein Sultan water.

Planning Challenges

The City of Jericho has many plans for future growth, all of which will increase the burden of the water sector. A major problem in the current water system is the lack of a comprehensive model of the domestic water network of the city, without which hydrologists and engineers cannot effectively plan for future developments that will affect the water sector. Therefore changes and additions may be made without consideration of the effect of those changes upon the network as a whole and its operations.[154] Changes and repairs that *are* made often do not meet Palestinian Authority requirements, particularly those standards detailing the size and location of the trenches in which the pipes are laid.[155] These shortcomings in addition to the poor quality of the water meters all increase the likelihood of increased intrusion of unfiltered water into the domestic network as a whole in the coming years.[156] The city continues to grow, and with that growth comes new connections to the domestic network every year, thus adding to the overall strain on the system. While these short-term problems are evident, future problems are inevitable because of the general lack of adequate and comprehensive long-term planning that seems to typify management in the city.

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[154] PHG *Draft Master Plan*. "The Performance of the Domestic Water Distribution System." 40.
[155] ibid
[156] ibid

The Challenge of Funding

Many of the previous challenges facing the development of a well functioning system of water allocation enumerated above are rooted in the shortage of funds available to the municipality in general and specifically the water department. Outlining the main source of the problem of water allocation in Jericho, the Master Plan points to: "the lack of stakeholder cooperation in setting up a convenient system for the sharing, distribution and management of water, ever since the water and irrigation networks were rehabilitated,"[157] which has subsequently led to further problems within the system such as equitable allocation among domestic and agricultural sectors.

Nearing the end of its second year of a three-year scope, the plan has received an extension of funds from the Paris municipality to construct a new pipeline with assistance from the Japanese aid agency.[158] The implications of the city necessarily relying on such short-term aid projects to develop its water sector will be examined more fully in the last section.

The PWA maintains a list of both active and proposed projects underway for each municipality. In Jericho, the primary goal is to improve efficiency in the existing network. Of the twenty-nine projects listed within the report; only twelve have secured funding (see the Appendix). [159] This crisis of funding is emblematic of the larger scale problem within the West Bank, not only to secure capital investment for projects, but also to ensure funding for the continuation of these projects and their long-term success.

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[157] PHG. *Jericho Draft Master Plan,* 4.
[158] Bsharat, Jalal. Personal interview
[159] "Basic Needs and Development: Ongoing and Proposed Projects by Governorates." *PWA* 117-119.

Pricing Challenges

One of the main reasons for the water sector's persistent funding problem is its failure to charge users for their services in a manner that would actually generate sufficient revenue to operate and maintain the system effectively. The Master Plan addresses the pressing issue of how to charge and collect money from domestic and agricultural consumers of water in an effective and equitable manner. The main conundrum for the establishment of a tariff system is how to provide an affordably priced source of clean water that allows the populace access to the rudimentary levels needed for human consumption, while at the same time encouraging conservation and creating a framework in which to manage the city's water resources. At the moment, the municipality employs a "Increasing Block Tariff" (IBT) in which the unit price changes after a given amount of consumption (see Table 3.1).

Table 3.1 The Current Block Tariff System in Jericho

Block no.	**Consumption Category**	**Price (NIS/M^3)**	**Tax (NIS)**
Min.	0-20 m^3	30 NIS	
1	20 -100 m^3	+1 NIS/m^3	10 NIS
2	101 -150 m^3	+2 NIS/m^3	10 NIS
3	151-250 m^3	+4 NIS/m^3	10 NIS
4	> 250 m^3	+5 NIS/m^3	10 NIS

Source: Palestinian Hydrology Group, *Draft Master Plan*. "Water Tariff and Fee Collection." 47

Consumption at or below twenty cubic meters is priced at 30 NIS (New Israeli Shekels), and consumption above that level is priced an additional shekel plus 10 NIS of tax. For

example, a customer consuming fifty cubic meters would be charged 70 NIS (the base rate of 30 NIS plus 1 NIS for each of the thirty additional cubic meters + the flat tax of 10NIS).

While this IBT structure generally may be considered more equitable than a flat rate, in which poor consumers pay a disproportionately high share of their income, it still has its problems. According to the PHG, 78 percent of consumers used amounts within the first bracket (0-100m^3) above the minimum level of the existing IBT system, therefore indicating that the spectrum of levels is much too broad to effectively provide an incentive for conservation (see Table 3.2). [160] The levels within the current block system seem to have been established arbitrarily, without any consideration of the implications or efficiency of those limitations. The report also mentions that employees of the municipality pay a further reduced price of 0.5 NIS for consumption within the first bracket.[161] Therefore a government employee paying for the same amount as the earlier would pay only 55 NIS for fifty cubic meters of water (the base rate of 30 NIS plus 0.5 NIS for each of the thirty additional cubic meters + the flat tax of 10NIS).

[160] PHG, *Draft Master Plan*. "Water Tariff and Fee Collection." 47.
[161] ibid

Table 3.2 Customer Categories According to Consumption 2009

Block no.	Consumption Range (m^3)	Additional Price	# of Customers Per Block	Percentage of Customers Per Block
1	0 -100 m^3	1 NIS/m^3	3207	**78%**
2	101 -150 m^3	2 NIS/m^3	497	12%
3	151-250 m^3	4 NIS/m^3	296	7%
4	> 250 m^3	5 NIS/m^3	133	3%
TOTAL			4133	100%

Source: PHG, *Draft Master Plan*. "Water Tariff and Fee Collection." 47.

Table 3.2 demonstrates that a large majority of the population are consuming within the first bracket. By breaking up this first bracket into smaller blocks of consumption, there would be two benefits for the system: increased revenue generated from those who consume more and a disincentive for conspicuous consumption.

In order to reform the tariff system so as to more accurately reflect ability to pay, the PHG refers to a survey conducted by the Environmental Protection Agency (EPA) that addresses "affordability" in water. The EPA suggests an appropriate percentage of income to spend on water resources is around two percent and the PHG states: ", 3-5% of monthly income remains a widely accepted rate for general expenditure on water services for an average family."[162] However, after comparing the amount consumed among different income groups, the lowest income group is spending over nine percent on water within this first bracket. In the summer months, the bottom two income groups spend over five and fourteen percent on water when it becomes more scarce and water is of

[162] PHG, *Draft Master Plan*. "Water Tariff and Fee Collection." 47.

greater need to maintain a healthy and comfortable living style.[163] This problem is especially prominent among the agricultural families as they generally have a lower level of education, more children and a lower income than the average family in the municipality.[164]

To alleviate this disparity, the PHG refers to the EPA's suggestion of creating a "lifeline" quantity that can be distributed to lower-income households at a reduced rate, after which the price can once again be raised to reflect the market value of the commodity.[165] Therefore, the system can gain more revenue by charging those excessively using water higher prices, while maintaining an equitable and affordable bottom line to ensure that those on the bottom of the socioeconomic latter still have access to an equitable part of the areas resources. These changes are likely to be unpopular with those within Jericho who consume greater amounts of water as they would pay more under a reformed increasing block tariff system.

The water department needs to gain approval from the Office of the Mayor if it hopes to implement any of the above reforms. At the time of my interview with Jalal Bsharat, the chief water engineer for the city, the water department was having trouble with the Mayor's Office about the necessity of making such a revision to the water tariff system. In order for a change of this nature to be made, the Mayor's Office needs to agree to the plan, and they fear the political repercussions of this for their future prospects and approval ratings within the municipality. According to Bsharat, the Water

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[163] ibid
[164] PHG. *Draft Master Plan*. "Farmers' Socio-Economic Background." 63.
[165] PHG, *Draft Master Plan*. "Water Tariff and Fee Collection." 50.

Department is suffering because of its inability to change the system and the subsequent shortages that this will eventually cause for all involved.[166]

Proposed Suggestions of the Master Plan

The Master Plan divides its proposals into three phases: short-term, mid-term and long-term. The short-term actions are the most straightforward and achievable (see Table 3.3).

Table 3.3 Short Term Phase Proposals of Master Plan

Action	**Objective**	**Starting Year**
Rehabilitation of Samed groundwater Well	Increase the rate of groundwater abstraction	2012
Drilling new groundwater well (New Jericho well)	Increase the rate of groundwater abstraction	2013
Purchasing water from Ein Ad Duke At Tihta spring	Increase the supply to the Domestic demand	2013
Construction of gray wastewater treatment Plants	Increase the rate of water reuse for the domestic demands	2012
Demand Management actions	Decrease the domestic demands	2011
Network Maintenance	Improve the domestic and agricultural networks, building reservoirs, installing pumps, improve the distribution regimes, training technicians, etc	2011

Source: Palestinian Hydrology Group. Jericho Master Plan *Powerpoint presentation.* 34.

Many of the projects within this first phase have already been initiated, as the Municipality of Jericho has begun to acquire necessary permissions for well rehabilitation and negotiations for purchasing additional water from Ein Ad Duke. The

[166] Bsharat, Jalal. *Personal interview*. ## Jan 2012.

above actions represent the suggestions of the Master Plan that are most likely to be quickly funded and achieved within the next few years. With the exception of "Demand Management actions" most of these actions have easily measurable outcomes. However, even within these short-term projects, there are ambiguities, especially within the demand management side of the equation. These ambiguities become even more pronounced in the next two phases of suggestions.

Table 3.4 Mid Term Phase Proposals of Master Plan

Action	**Objective**	**Starting Year**
Construction of Jericho waste water treatment plant (including collection network)	Collection and treatment of generated wastewater in the domestic demands	2015
Construction of mixing tank	To be used for mixing brackish groundwater with treated waste water	2015
Construction of gray wastewater treatment Plants	Increase the rate of water reuse for the domestic demands	-
Demand Management actions (changing cooling systems, modifying tariff system, institutional reform)	Decrease the domestic demands	-
Storm water Harvesting	To utilize the storm water in wadis	2015
Constriction of Brackish water treatment plants	To utilize the brackish groundwater	2015
Network Maintenance	Improve the domestic and agricultural networks, building reservoirs, installing pumps, improve the distribution regimes, training technicians, etc	

Source: Palestinian Hydrology Group. Jericho Master Plan *Powerpoint presentation.* 35.

In this "mid-term" phase, represented here in Table 3.4, some of the projects lack a defined start date, and the demand management actions remain less clear and specific than the steps to increase water supply. The summary includes such disparate elements

as "changing cooling systems, modifying tariff system, institutional reform" all within the blanket term of "Demand Management actions." Surely something as complicated and nuanced as "institutional reform" requires its own category and specifications. Many of the suggestions in this phase would greatly improve the efficiency of Jericho's system of allocation; however, the plausibility of these suggestions remains unclear. Has funding been secured for any of these projects? Will there be any political barriers to carrying out these suggestions? Questions such as these are unanswered at this point, but will need to be addressed soon if the proposals are to be taken seriously by the Municipality.

Table 3.5 Long Term Phase Proposals of Master Plan

Action	**Objective**	**Starting Year**
Construction of gray wastewater treatment Plants	Increase the rate of water reuse for the domestic demands	-
Demand Management actions (changing cooling systems, modifying tariff system, institutional reform)	Decrease the domestic demands	-
Network Maintenance	Improve the domestic and agricultural networks, building reservoirs, installing pumps, improve the distribution regimes, training technicians, etc	
Storm water Harvesting	To utilize the storm water in wadis	-
Constriction of Brackish water treatment plants	To utilize the brackish groundwater	2015

Source: PHG. "Jericho Master Plan" *Powerpoint presentation,* 36.

There is even less specificity in the long-term phase proposals, reflected in Table 3.5 and although it is important to maintain flexibility in response, the long term plan needs to have much more specific goals and greater scope into the future. In terms of serious planning for the water sector, these "long term" goals are in actuality relatively short-term in span. Obviously, actions such as "demand management" and "network maintenance" will continue to be relevant and important for long-term planning, but there are systematic problems with the allocation system that are left out in this set of proposals. Although the issue of funding underlies the municipality's ability to tackle all of the other main allocation challenges, no solutions are put forth within the Plan to address it.

Challenges to implementing the Master Plan's Suggestions

Although the Master Plan suggests many changes to enhance the operation of the system, its plausibility remains low. Bsharat is pessimistic about the future growth of the city and the municipality's ability to manage that growth and effectively provide adequate and constant water access to meet demand. Although the increased amount of tourism is assumed to be good for the economy of Jericho as a whole, it will also put an increased strain on the allocation of water as well as complicate the dichotomous allocation agreement between agricultural and domestic consumers. Additionally, Bsharat referenced the construction of a training facility that has been operating for the past five years in Jericho in which a significant percent of the military and police forces of the PA are trained. Because these individuals do directly pay for the water that they

consume while at the base, they subsequently pay less attention to their consumption patterns and use more than perhaps they would if they were paying for usage.[167] The same line of reasoning could also be applicable to the consumers in jails, although it is probable that the inmates' access is much more limited and controlled by those other than themselves. However, the presence of the training camp also provides the possibility for the municipality to receive special funds from the US and possibly other donors. The Jericho Water Department has applied for aid through the American Consulate because of a security agreement between the US and Palestinian Authority. The US has agreed to fund a project constructing 5,000 m^3 tank and three-kilometer pipeline. These projects are currently being designed through Jericho's public works department.[168] Despite the positive elements of such projects, reliance upon foreign aid and prioritizing the goals of foreign donors come with a unique set of problems, to be examined in the conclusion.

Controlling consumption, which is recognized by Bsharat as the number one priority for the water sector, also includes improving the infrastructure of the networks and increasing efficiency of those networks. Because the current network operates on more or less a loop, it is difficult to measure consumption and control allocation. The addition of separation valves and the creation of an additional pipeline in the topographically higher area in the south of Jericho will help with achieve a more reliable and measurable flow. By changing meters so that they measure the *volume* rather than the time used by a consumer, the pricing will more effectively correlate with consumption.

[167] Bsharat, Jalal, interview. Jan 2012.
[168] Bsharat, Jalal, interview.

"Public awareness" is part of the proposed solution to controlling consumption, but its relative importance is downplayed, because changing ingrained mentalities appears to be too challenging for the seemingly minimal result. The implications of this fatalistic attitude will be examined further in the conclusion.

However, issues of demand cannot be tackled without addressing the other side of the equation. The Plan also aims to increase supply by purchasing additional water rights from surrounding areas, such as the recent acquisition of water usage from a neighboring spring Ein Ad Duke that will total 20,000 m^3 a month.[169] Despite the optimistic tone of the Master Plan, the acquisition of new sources of supply is complicated by the interconnectedness of Palestinian water sources and the control thereof with Israeli authorities. While Jericho is less affected by Israel than other areas in the West Bank (such as the village of Auja, whose spring has been run almost dry after Israeli drilling in the region), there are still significant restrictions on the drilling of new wells and the rehabilitation of old wells. [170] According to Bsharat, because of these restrictions, the Palestinians are not even consuming the quota allotted to them in Oslo. Israelis often use this statistic to demonstrate the reverse: that the current agreement does not need to be increased because the Palestinians have not been using their allotted share. This is yet another example in which the same information yields contradictory interpretations.

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[169] Bsharat, Jalal. *Personal Interview.* and *Jericho Water Master Plan* powerpoint.

[170] Interview with Jalal Bsharat- also see the work that Friends of the Earth Middle East (FoEME) has been conducting with their Eco Park at Auja for more details on the situation in Auja, which is partially located in area A and are C <http://www.jvec.ps/index.php?option=com_content&view=article&id=89&Itemid=115&lang=en>.

According to the framework set up by the Oslo Accords and subsequent negotiations, any new projects within Area A locations such as Jericho in the West Bank must first be approved by the Joint Water Commission (JWC), whereas laws regarding Area C permit no construction whatsoever. The JWC has never granted permission for the drilling of deep wells, and even obtaining the permission to drill a shallow, alluvial well can take up to four years.[171] These shallow wells generally produce only thirty to fifty cubic meters a day, which seems miniscule when compared with the much larger output of Ein Sultan. Any new resources that aim to seriously increase the supply will have to supply more than that. Additionally shallower wells are much more susceptible to seasonal variations and their waters tend to be of lesser quality than that found in deeper aquifers. Bsharat related an incident in which the municipality received aid from American Near East Refugee Aid (ANERA), a US funding agency, to construct a new project in the municipality. The department had to wait for two years after receiving the funding to get approval from the JWC. Bsharat considered it lucky that they did not lose the funds altogether, because often agencies will have a time limit on projects and funds released. The PWA has also been in negotiations to get permission to drill a borehole in Jericho, but according to the most recent meeting, which occurred a few weeks prior to the interview in January, the JWC had denied the request.

The municipality is also involved in a project that will rehabilitate a well abandoned by an Israeli settler close to the region, sometimes referred to as "well number one." The rehabilitation project hopes to mix water from well number one, which has a

[171] Bsharat, Jalal. Interview.

fairly high salinity content, with the water from Ein Sultan. This project is being funded in part by the Japanese and their support for the initial stages of an agro-industrial zone, located north of the city. The agreement stipulates that the Japanese will provide 50 m^3/ day, part of which they will be required to share with the Aqbat Jabr refugee camp. Phase one of this project has been completed and the municipality is beginning to enter phase two, while continuously seeking new donors.

These short-term projects with a specific goal that are funded by foreign aid demonstrate one of the main problems of Jericho's water system. The projects are only possible because of foreign aid, and must therefore fit both within the narrow scope of the funding cycle, and reflect the goals of the donor state or organization. Without a steady flow of internally generated revenue, the city will continue to experience the same difficulties within the water sector, or possibly even worse as the city experiences more unsustainable growth. Essentially, what was gained by the creation of the Plan was a comprehensive overview that pinpointed the many problems within the system. The changes necessary in order to not only fix the problems as they exist today, but plan for the future of the city will only be possible if those with sociopolitical power are willing to support reforms.

Conclusion

In many ways, the case of Jericho's water supply illustrates a basic challenge of democratization and state building: how to acknowledge and respect informal institutions that sustained a community for millennia, yet make necessary changes for future development. While Jericho was never formally a colony, the vestiges of foreign sovereignties from the Ottomans to British, Jordanians and Israelis have nonetheless affected the city and its water operations. Although some efforts were made during the late Ottoman era to reform both land and water ownership and taxation in the area, no serious reform efforts occurred until the Mandate period. British plans to drastically improve and "modernize" Jericho's irrigation and agricultural practice yielded little success save some repairs to the system of aqueducts. Jordanian rule generated a brief economic boom, but these changes did not develop real infrastructure in Jericho, as the local leadership was dominated by royalists. Israeli rule saw the development of some municipal institutions and city utilities, even if this period was also one of increased limitations on Palestinian agricultural and water use in Jericho. After centuries of foreign rule, eighteen years of Palestinian self-governance has hardly been sufficient for Jericho to create and manage its own infrastructure for efficient, economic, and equitable water allocation.

Efforts to reform and institutionalize water allocation that were made under foreign rule consistently disregarded the local informal institutions eventually proved to be failures. The British attempted to impose their agricultural "expertise" and "modern"

irrigation schemes learned in other parts of the Empire onto the perceived "backward" fellahin techniques practiced by the Palestinian farmer, which, in actuality, were often more suitable for the terrain than the proposed solutions of the British. Not only did these British initiatives fail to significantly change practices in Palestine, but their research facilities were also highly visible and easily targeted symbols of an unwanted British presence. This rejection is typical of the distrust that foreign institutions have received within the city's water sector. Although Jericho is currently classified as Area A, a municipality completely under Palestinian control; the Israeli Occupation remains a serious and daily challenge to the municipality's ability to function as a independent government. Despite the changes in formal laws and nominal ruling forces, informal social agreements and frameworks of allocation have continued into the present day.

Although Jericho has not flourished, it has been incredibly resilient throughout the millennia of its existence. Ein Sultan and its abundant waters, and the framework of informal institutions able to locally govern how water is used in the community have been central to this resilience. Within a small irrigation community that collectively shares its water resources, such as Jericho, the individuals will be more likely to consider the entire community and share the burden of droughts and the bounty of surpluses among all its members.[172] A common element in the ruling policy of each of the outside governments that ruled Jericho was their failure to consider these existing local institutions and their importance to the community and its system of allocation.

[172] Trottier, *Allocating and Managing Water for a Sustainable Future*. 9.

> Respect of local institutions often prevents any sectorial reallocation of water from irrigation to domestic use in cities for example. Treating water as a public good often leads us to call for such a reallocation on the ground of sound economic use. The full impact of such a reallocation must be evaluated though. It would entail the disappearance of local institutions whose resilience has ensured the security of their communities while simultaneously disrupting the livelihoods of these community members.[173]

Jericho's informal institutions have survived throughout the changes in ruling structure, and while they can be resilient to economic and environmental challenges, they also can be resistant to useful change. This is obvious when looking at the power that the Ein Sultan Water Users Association and their constituency of traditionally powerful agricultural elite continues to wield in the water allocation decisions of Jericho today.

Whereas foreign rule ignored these informal institutions, the Palestinian sector is dominated by them. Jericho needs to reach a happy medium in which the legitimacy and importance of organizations such as ESWUA are recognized, but public processes have enough power and legitimacy to overrule the decisions of these institutions when necessary for the advancement of the water allocation system and, by extension, the city as a whole. The framework for allocation that is currently stuck at a forty-two percent for domestic use and fifty-eight percent for agricultural allocation restricts future flexibility and is not based on any set of guiding principles, thus hindering future development. Given that any decisions to change the status quo would require some politically unpopular decisions and enforcement, it is unlikely that such change will occur in the near future. In the meantime, the plan seems to be to operate within this limiting framework and improve the system as much as possible without a complete overhaul.

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[173] ibid.

The Jericho Master Plan is the third such master plan that the PHG has conducted; it also created plans for Tulkarm and Tubas in the northern West Bank. While the Palestinian Water Authority (PWA) organizes more general reports about the state of water consumption and allocation in the West Bank, it lacks the resources to carry out detailed studies such as these master plans for all of the areas it controls, or the territory as a whole. The central office of the PWA lacks the resources and institutional capacity to carry out planning on a scale similar to its Israeli counterparts. A generally unpopular public office, the head of the PWA must negotiate within the Joint Water Commission (JWC) and obtain Israeli permission for any number of small to large-scale projects in the territories. If maintaining and repairing existing systems are so difficult and time-consuming, then it is obviously improbable that the agency will be able to focus on long-term planning, or be able to seriously tackle consumption attitudes and patterns. Therefore, these research and planning responsibilities fall to local authorities and nongovernmental organizations, such as the PHG. While the services these organizations offer are crucial and much needed, they lack the level legitimacy and enforcement capabilities that a strong government utility would be able to offer. The official Palestinian institutions are also less than two decades old; hopefully, with time they will gain legitimacy and experience.

The engineering solutions proposed by the PHG and the Master Plan will undoubtedly improve the system of water allocation in Jericho if successfully implemented. However, these solutions will not be enough to adequately address rising demands in the future. Because of its relative per capita water wealth compared to other

Palestinian cities, Jericho has been able to avoid rationing that exists in many other Palestinian cities, especially during the summer months. There is a fear that if the growth in Jericho continues, then the city will be forced to enforce similar rationing measures, even after the technological advances made from the suggestions of the Master Plan.[174] If the proposed changes encounter some challenge and are not carried out, Jericho will be at an even greater risk of shortages in the future. At the same time, officials and engineers place little value in education and the conservation potential with raising public awareness. While there is a place for public awareness in the Master Plan, the main vehicle for change remains purely technical solutions.

Laying out concrete and measurable goals and plans for increasing the supply is much easier than establishing achievable and much needed institutional changes of consumption patterns. The plans for increasing efficiency and extending water supplies are very specific, detailing achievable goals for the near future, such as: the construction of gray water treatment plants beginning by 2012, storm water harvesting from the wadis by 2015 and brackish groundwater treatment plants by 2015. On the other hand, the short-term, mid-term and long-term plans for "Demand Management actions" remain vague, with no clear start date or measurable objectives.[175] This is a prime example in which effective environmental communication strategies could be employed in order to better decrease demand and begin to change restrictive institutional frameworks and established behaviors. If the gauge of prosperity in Jericho continues to be measured by

[174] Bsharat, Jalal. *Personal Interview*. 28 Jan 2012.
[175] *Palestinian Hydrology Group.* Jericho Master Plan powerpoint presentation, February 2012, pp. 34-36.

owning private pools and extensive private gardens, then increasing affluence and population growth will further increase the stresses on the system. Although planners are wise not to champion pubic awareness as a "silver bullet" capable of solving all of the municipality's allocation problems, communication could nonetheless play an important role in managing demand.

As a point of reference, Israel has encouraged an atmosphere of extremely conscious water consumption, utilizing public ad campaigns, environmental education programs and social pressure. This is, of course, not to suggest that the methods used in Israel to decrease consumption should be simply pasted onto the completely different situation of Jericho. Cultural differences and attitudes need to be considered carefully, and any efforts at changing consumption habits would need to come from within the community itself. The issue of creatively addressing water demands could benefit from what Ramirez and Quarry call a "champion," an individual dedicated to not only the success and outcome of a project but also the process of communication as a whole.[176] The engineers in the field are highly dedicated but do not place much faith in communication, most likely because the scope of the immediate technical challenges and shortcomings of the network seem to trump any such "soft" solutions. It is difficult to be overly concerned with changing attitudes toward conspicuous consumption when such rudimentary problems such as pump failures and the lack of a wastewater plant seem more immediate and obvious problems.

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[176] Quarry, Wendy and Ricardo Ramírez. Communication for Another Development: Listening Before Telling. New York: Zed Books (2009)

Another challenge of the Master Plan is the time span of the goals. Like most donor-funded projects, the scope is necessarily limited to several years, after which the projects can be evaluated and progress can be measured. In contrast, Israel's water sector (formerly known as the office of the Water Commissioner and recently reorganized as the Water Authority) has a Master Plan that considers all aspects of water management for the immediate and long-term future. Their long term planning, such as the building of desalination plants and network infrastructure, considers the water needs of the state and its neighbors for the next fifty years or longer.[177] Perhaps, in some ways, the narrow scope of its projects could be seen as a positive aspect for Jericho and the Palestinian Authority as a whole. Without the many levels of bureaucracy, it may be able to be more flexible, and not be confined by the institutionalization and red tape of their counterparts across the Green Line. However, these benefits would be minor at best. The inability of Jericho to plan for more than its immediate water needs will only increase the problems of the city with time. Jericho requires serious long term planning, but the problem of funding necessarily complicates its ability to do so. An overhaul of the tariff system, although not politically popular, could possibly allow the municipality to gain more revenue and control consumption at once.

Although it can be useful to compare the situations in Israel and the West Bank, it is also important to remember that the historical and social specificities of the region, as has been demonstrated in the first chapters of this case study, make the context of Palestine unique; and Jericho represents a distinct subset of those conditions. It would be

[177] Zaide, Miki. *personal interview.* 13 June 2011.

unwise to simply transplant the methodologies and institutions of one state onto the different context of another. The concrete and psychological vestiges of Occupation in Jericho remain real barriers to the success of Palestinian self-control of their water resources. Actors in the Palestinian water sector are paradoxically both dependent upon Israeli support and are limited by Israeli constraints. Although Jericho is hypothetically a self-controlled Palestinian municipality, it operates within a framework in which it has little voice or control. Jericho is surrounded by large amounts of territory, even within its own governate, which is partially or completely dominated by Israeli rule.

Instead of relying on steady, internally generated utility fees for service or tax revenue, the official and nongovernmental actors in the water sector alike must rely on the unpredictable flows of foreign aid. The international aid flowing into the West Bank is often allocated specifically for the construction of wells, which can lead to over-extraction and unsustainable consumption from an aquifer.[178] Donors generally like to fund projects that have tangible and measurable results; however, this practice creates an unsustainable allocation situation and prioritizes short-term results at the cost of lasting solutions. Funding the drilling of new wells requires that the municipality navigate the lengthy bureaucratic process of gaining permission through the JWC. Despite these frustrations, Jericho and other Palestinian municipalities that are struggling with limited funds, will unlikely turn down any aid that offers even temporary or unsustainable solutions. By revising its methods for collecting internal revenue, perhaps Jericho would

[178] Trottier. *Allocating and Managing Water,* 13.

be able accept aid only when furthering its own projects, so that it is can assert its own priorities rather than being subject to the whims of donors.

The lack of overarching unity within the West Bank and the unique situations of the villages, towns and cities within it demonstrate a real challenge to state and institutional capacity building. The local "grassroots" organizations that address water issues exist independently of one another and have been developed with unique sets of norms and practices that have not only contributed to their impressive lasting power, but which also make it difficult for the PA to develop an overarching system for regulation.[179] Small-scale efforts at centralizing and consolidating power, such as the Master Plan, which will provide some structure and short-term planning to an unorganized department, have a restricted reach. There are limitations on what can be accomplished within this local framework. The success of informal allocation institutions and "irrigation communities," such as have existed in Jericho throughout the changes of formal leadership, provide a measure of legitimacy and trust among the population, despite the unfairness that can result from them. However, at the same time, residents are now expecting that the PA can provide water for domestic consumption without interfering with these informal institutions.

While the two systems of allocation are not inherently incompatible, both irrigators and Jericho's water administrators could benefit from some measure of give and take. The state needs to recognize the legitimacy of these informal institutions, and the irrigation communities need to recognize that agriculture no longer plays as central of

[179] Trottier. *Allocating and Managing Water*, 7-8.

a role in Jericho as it did in the past, and cede control of some of the resources accordingly. If any future Palestinian state hopes to replicate the successes of informal systems through the centralization of power and institutionalization, it must consider both the successes and failures of these local efforts to negotiate this difficult gray zone. Informal institutions sometimes have formally recognized representative bodies such as the ESWUA in Jericho, but other times are not so clearly articulated. Either way, recognizing their social, political and economic power within the community as a tool for the formal to gain legitimacy will be essential for the success of water allocation improvement in a future Palestinian state. This balance has yet to be achieved in Jericho, but the coming years should prove to what extent the municipality has been able to implement structural and taxation changes necessary for the success of the water sector and the prosperity of the city.

Appendix: List of Active and Proposed PWA Projects in Jericho

Active Projects in Jericho as of 2009

Community	Type of Projects	Project Components	Status/Donor	Implementing Agency	Cost in USD $
Jeftlik	Water	Rehabilitation and extension of the internal water network, reservoir, and main pipeline	Secured fund by MoF	PMU	25,000
			Committed USAID/EWAS	ANERA	100,000
			Committed by KFW/ UNDP	UNDP	90,000
			Funded by OXFAM	OXFAM	200,000
Fassayel	Water	Rehabilitation and extension of the internal water network. Reservoir.	Submitted to JICA	PMU	300,000
Ein Dyuk Tahta	Water	Rehabilitation and extension of the internal water network	Potential donor KFW	PMU	300,000
Jericho	Water	Rehabilitation and equipping of Jericho Well no.1 with pump and all its accessories. Construction of main pipeline from the well to Al Sultan spring .	Funded by MoF	PMU	400,000
		Replacement of pipes and improvements of the internal water network	Committed USAID/EWAS	ANERA	94,000
		Extension of the existing water network	Funded by KFW	PMU	400,000
Aqbat Jaber Camp	Water	Rehabilitation and extension of the internal water network	Ongoing Funded by French Government	Bencanson / PMU	300,000
		Reservoir 1000 m^3, transmission pipeline from Jericho well no.1	MoF	PMU	280,000
Al- Auja*	Water	Construction of internal water network. Reservoir	Committed USAID/EWAS	ANERA	1,500,000

*PWA in cooperation with MoA will propose a huge project for using and storing Al-Auja spring's water in addition to the drilling of a new well

Source: Palestinian Water Authority: Palestinian Water and Wastewater Sectors. "Basic Needs and Development of Ongoing and Proposed Projects by Governorates." (Oct 2009)

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Proposed Projects of the PWA in Jericho as of 2009

Community	Type of Project	Project Components	Status/Donor	Cost in USD $
Marj Naja	Water	Rehabilitation and extension of the internal water network	Needs Funding	200,000
	Wastewater	Wastewater network	Needs Funding	TBD
Izebet Az Beidat	Water	Rehabilitation and extension of the internal water network	Needs Funding	200,000
	Wastewater	Wastewater network	Needs Funding	TBD
Marj Al- Ghazal	Water	Rehabilitation and extension of the internal water network	Needs Funding	200,000
	Wastewater	Wastewater network	Needs Funding	TBD
Jeftlik	Wastewater	Wastewater network	Needs Funding	TBD
Fassayel	Wastewater	Wastewater network	Needs Funding	TBD
Al- Auja	Wastewater	Wastewater network	Needs Funding	TBD
Nuema'a	Water	Rehabilitation and extension of the internal water network	Needs Funding	300,000
	Wastewater	Wastewater network	Needs Funding	TBD
Ein Al- Dyuk- Al-Fuqa	Water	Rehabilitation of the internal water network	Needs Funding	200,000
	Wastewater	Wastewater network	Needs Funding	TBD
Ein Al-Sultan Camp	Water	Reservoir 500m^3	Needs Funding	215,000
	Wastewater	Wastewater network	Needs Funding	TBD
Ein Dyuk Tahta	Wastewater	Wastewater network	Needs Funding	TBD
Jericho*	Wastewater	Wastewater network and treatment plant	Needs Funding	20,000,000
Aqbat Jaber Camp	Wastewater	Wastewater network	Needs Funding	TBD

Source: Palestinian Water Authority: Palestinian Water and Wastewater Sectors. "Basic Needs and Development of Ongoing and Proposed Projects by Governorates." (Oct 2009) 118-9.

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