



**Brandenburg University of Technology Cottbus**

Bachelor Thesis

**CONTENTIOUS WATERS IN THE MIDDLE EAST: AN ANALYSIS OF THE  
ISRAELI-PALESTINIAN WATER CONFLICT**

By Heber Tito Galvez

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1<sup>st</sup> supervisor: Prof. Dr. Wolfgang Schluchter

2<sup>nd</sup> supervisor: M.A. Conrad Kunze

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## **AFFIDAVIT**

I hereby declare that all information disclosed in this thesis is a product of my original and individual work. Neither this work in its complete form, nor any of its parts has been submitted to any university other than the Brandenburg University of Technology for the award of any kind of academic degree.

Furthermore, I confirm that all sources other than my own have been fully acknowledged.

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## **ABSTRACT**

As one of the five key issues left for discussion during final status negotiations, this thesis will deal with water rights and distribution in the West Bank, within the framework of the Israeli-Palestinian conflict. First, a critical overview of the most relevant -and at times discordant- literature is presented, and compared with up-to-date hydrological, economic, and demographic data for further interpretation. Although responsibilities over the dire conditions of the Palestinian water sector can be attributed to both sides, the direct implication of the Israeli occupation in this problematic is made clear. This is further supported by fieldwork carried out in six Palestinian communities for a more empirical approach to the problem. The respective study-sites were selected by taking into consideration parameters utilized by the Water Poverty Index (WPI) where a pair of communities shares all but one of the variables, simplifying the analysis substantially.

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## LIST OF ABBREVIATIONS

AI	Amnesty International
ARIJ	Applied Research Institute – Jerusalem
CA	Israeli Civil Administration of the West Bank
CIA	Central Intelligence Agency
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
Green Line	The Armistice lines of 1949
IMF	International Monetary Fund
IWA	Israeli Water Authority
JICA	Japan International Cooperation Agency
JSETS	Joint Supervision and Enforcement Teams
JWC	Joint Water Committee
JWU	Jerusalem Water Undertaking
l/c/d	liter per capita per day
MCM	Million cubic meters
MENA	Middle East and North Africa
MO	Military order
M&A	Movement and Access
m <sup>3</sup> /cap/yr	cubic meters per capita per year
NIS	New Israeli Shekel: 1NIS = 0.206 € (as of July 2011)
NWC	National Water Council
oPt	Occupied Palestinian Territories

OCHA	United Nations Office for the Coordination of Humanitarian Affairs
PA	Palestinian Authority
PCBS	Palestinian Central Bureau of Statistics
PHG	Palestinian Hydrology Group
PLO	The Palestine Liberation Organization
PPP	Purchasing power parity
PWA	Palestinian Water Authority
UN	United Nations
UNEP-DEWA	United Nations Environmental Programme, Division of Early Warning and Assessment
UNISPAL	United Nations Information System on the Question of Palestine
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
WASH	Water and Sanitation hygiene
WBWD	West Bank Water Department
WHO	World Health Organization
WPI	Water Poverty Index
WSSA	Water and Sewerage Authority Bethlehem

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## I. INTRODUCTION

From the waves of European Zionist immigration in the late 19<sup>th</sup> century, to the recent Palestinian attempt for statehood recognition at the United Nations, no other struggle in the world has aroused more passions, polarized more nations, and influenced international and regional affairs, than the ongoing Israeli-Palestinian conflict.

As one of the longest standing conflicts in modern history, the complexity of its analysis requires deep and critical knowledge based on historical, religious, and ethnic grounds, each being interdependent from each other. Although a myriad of literature exist in these domains, the controversial nature of the situation allows for discordant -and at times contradictory- data, making it a challenge for any novice in the field to acquire an impartial approach to the conflict. This situation has motivated the author of this thesis to investigate critically and pragmatically one of the most contentious issues at the core of the confrontation: water resources.

To better understand the importance of water within the conflict, the Oslo II accords of 1995 –the latest major attempt for a peace deal- classified the main issues for final status negotiations as: Jerusalem, settlements, borders, refugees, security, and water. Being on par with the most well-known and publicized affairs in the dispute, the relevance of water resources as a matter of national security and a pre-requisite for any viable state -either Israeli or Palestinian- is at times overlooked by the general media.

Specifically, this thesis will explore the current situation in the West Bank due to the fact that extraction, management, and distribution of water resources in this area are still partly dictated by the Israeli government. While many catalog this situation as “inequitable” in view of the disparate utilization of resources in favor of the latter, the government of Israel claims it is fulfilling its responsibility in the territories by not breaching any previous agreements or international law

(Israeli Water Authority, "2009 The Issue" 22). On the other hand, the Palestinian Authority claims that they have been denied their rightful share of transboundary waters and got their basic human rights jeopardized under Israel's military rule (1). This is the main dilemma around which this work will gravitate and aims at questioning the plausibility of each of the above-mentioned arguments.

In order to do this, first an overall introduction to the conflict will be provided by means of historical accounts that will serve as background to understand the intricate role of water throughout this process. This, in combination with up-to-date hydrological, economic, and demographic data; will provide the foundation needed to further understand if an actual disparate utilization of water resources occurs in this case.

Second, a review of the main agreements as well as the most comprehensive reports regarding the current state of the Palestinian water sector will be discussed. These reports are the basis for a theoretical discussion of the problem since they offer variegated information from governmental, institutional, and independent perspectives.

Finally, a pragmatic approach will be offered by the author's own fieldwork in the Palestinian territories between the months of March and June early this year. Six communities were carefully selected and interviews were carried out in order to assess the accurate representation of data, how this depicts the actual situation on the ground, and if any direct relationship between the Israeli occupation and water scarcity can be further established.

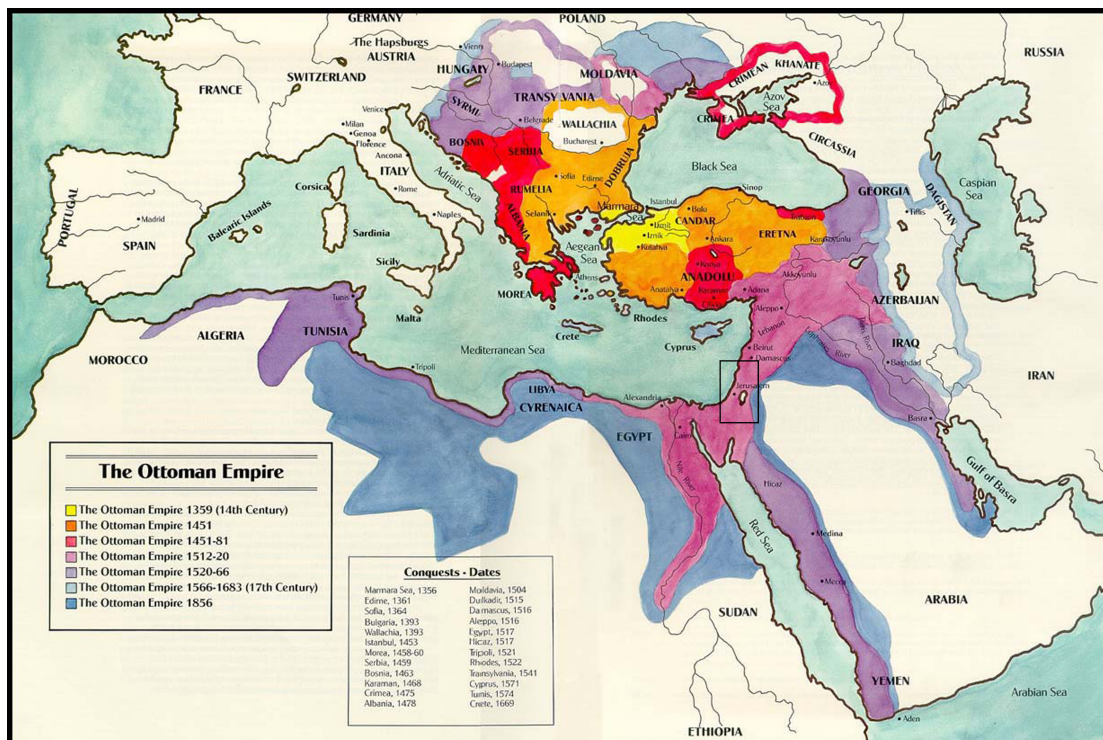
## II. BACKGROUND

### 1. POLITICAL CONTEXT

#### 1.1 Palestine until 1967

Narratives regarding the Holy Land can be traced as far as the bible's old testament itself, but for the purpose and context of this thesis, February 14<sup>th</sup> 1896 will be used as an initial reference point. It was this date when the Hungarian journalist Theodor Herzl published the influential book *Der Judenstaat -The Jewish State-*, in which he affirmed his political vision for the reestablishment of a Jewish homeland in the land of Palestine (Dan 30). This doctrine became the intellectual basis for the international movement known as Zionism.

At this time, Palestine was not a distinct political unit but rather part of greater Syria, spanning the Jordan River, stretching from the Mediterranean, and up to the frontiers of Iraq (Rogan 197). Also, as most of the Middle East and North Africa, it was under the control of the Turkish ruled Ottoman Empire (see fig. 1).



**Figure 1.** Map of the Ottoman Empire, 1359-1856  
Source: Ottoman Souvenir. Adapted by author

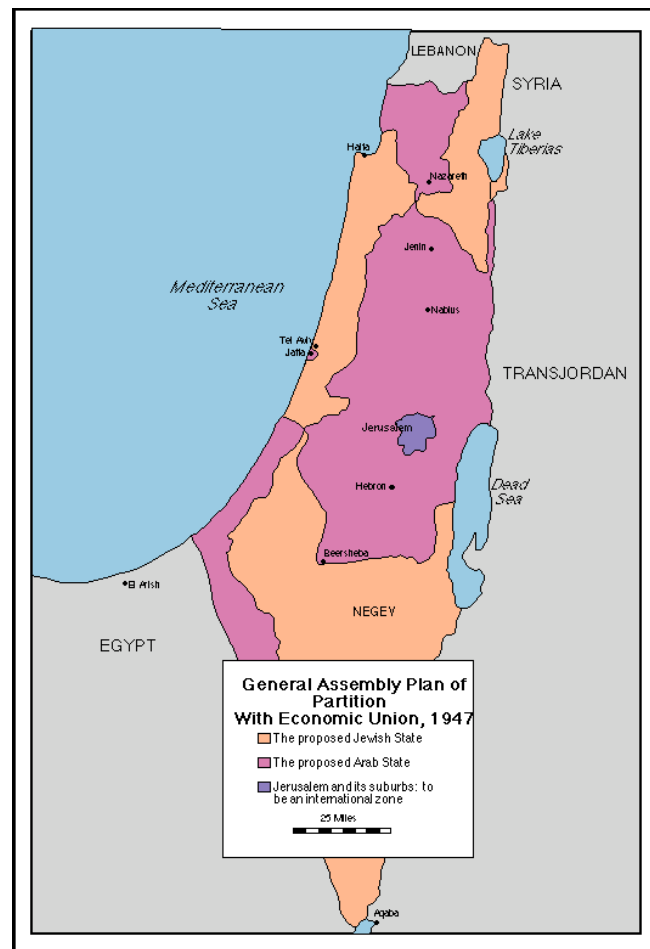
The political situation in Europe, in addition to its increasing anti-Semitism, made the Jewry of the world embrace the Zionist doctrine and waves of immigration towards Palestine started occurring as early as 1888 (Dan 279). For example, in 1882 the native Jewish population of Palestine consisted of about 24,000 people (about 3% of the total population), and by 1914 this amount rose to about 85,000 (Rogan 198). In the meantime, the 85% Arab-Muslim majority watched this expansion with mounting concern.

At the midst of World War I, the British support for Zionism became official foreign policy with the Balfour declaration of 1917 by which “His Majesty’s government view with favour the establishment in Palestine of a national home for the Jewish people...”(The Times). This document was going to be of critical importance because of the assertion of the establishment of a future Jewish state, and also because it was the trigger for future conflict with the Arab majority who saw it as an insolence to their rights in the land. The end of World-War-I resulted in the disintegration of the Ottoman Empire, and the administration of Palestine was next handed over to Great Britain by the League of Nations (Rogan 197).

The “British Mandate for Palestine”, as it was going to be known, officially lasted between the years of 1920 and 1948, and it was anything but a peaceful transition (Rogan 197). From the beginning, the stigma of the Balfour declaration triggered many violent clashes with the Arab population, and the subsequent attempts of modifying its message initiated a series of violent clashes with the Jewish people themselves. In addition, as World War II initiated, increased Jewish mass immigration from Europe resulted in further violent clashes between Arabs and Jews.

With the legacy of a fragile economy after a sizable war, the increasing violence over its mandate in the Middle East, and the diplomatic failure to find a common ground between the Arabs and Jews of Palestine, Britain decided unilaterally to withdraw from the territories on September 1947 and entrust it to the newly formed United Nations the ensuing year (Rogan 252).

On November, a partition plan was discussed and approved at the UN's general assembly allowing for the contiguous creation of an Arab and Jewish state, and the internationalization of the city of Jerusalem. While the Jewish people joyfully received this partition plan, the Arabs considered it to be a huge defeat that they did not accept (see fig. 2).



**Figure 2.** United Nations partition plan of 1947  
Source: Mideast Web Maps

On May 14<sup>th</sup> 1948, while the British were symbolically lowering their last flag over its mandate and Israel was declaring its independence, both sides were preparing for what was going to be known as the first Arab-Israeli war over the disputed land. With involvement of the Egyptian, Iraqi, Jordanian, Lebanese, and Syrian armies, the main consequences of this war were the reaffirmation of the newly formed state of Israel, and the annexation of the West Bank and Gaza by Jordan and Egypt, respectively (see fig. 3).



**Figure 3.** Map of Israel and Palestine after the 1948 war  
 Source: The Global Education Project

### 1.2 Occupation and the “Six-day war” of 1967

The period between 1949 and 1967 was characterized by a series of political crisis in the Middle East, which reached its climax with the Suez War of 1956. It was then that governments of Israel, Great Britain, and France carried on a tripartite offensive against Egypt due to the latter’s intention of nationalizing the Suez Canal (Oren 11). This intervention added to military tension due to geopolitical interest from the US and the Soviet Union at the midst of the Cold War, made the entire region a volatile quagmire.

As for the Palestinians, this period represented their disappearance from the international political community. Either under Jordan or Egypt's jurisdiction, the question of Palestine and its right to self-determination stepped into the background, and it was not until the aftermath of the 1967 war that they took into their own hands their struggle for national aspirations against Israel and other Arab states that got into their way (Rogan 343).

After the Suez crisis of 1956, Israel and its neighbors engaged into an arms race in preparation for the inevitable next round of war. A series of provocations, diplomatic disagreements, and political and military support from the US and the Soviet Union respectively, triggered the first wave of attacks on May 5<sup>th</sup>, 1967. In a surprise operation, the Israeli warplanes made ineffective most of the Egyptian, Jordanian, and Syrian air forces, gaining air space supremacy in the first day of battle. The offensive lasted for six days until a cease of fire was finally agreed on May 10<sup>th</sup>. Until then, Israel had already gained control of the Sinai Peninsula in Egypt, the Golan Heights in Syria, as well as the West Bank and Gaza strip, as depicted in figure 4.

The political significance of the 1967 war and its consequences can be felt up to this day (Rogan 340). First, it was a moral defeat for the Arab population and its leaders, which caused a wave of coups throughout the region that placed in power controversial figures such as Muammar al-Qadhafi in Libya, and the al-Assad dynasty in Syria. Second, it created strong Arab antagonism and sense of revenge against Israel, which cemented the United States support for the latter and it marked the beginning of the so-called "special relationship" between these nations. Finally, and the most critical one for the purpose of this thesis, refers to the annexation of the West Bank and Gaza Strip by the State of Israel, which occupation remains up to this day.





**Figure 4.** Map of the Near East after the 1967 War  
 Source: Palestinian Academic Society for the Study of International Affairs

### 1.3 The Oslo Accords

The defeat of 1967 was, ironically, a moment of liberation for the Palestinian armed struggle. The Palestine Liberation Organization -PLO-, founded in 1964 as the representative body of the Palestinian people, started gaining a stronger voice and international recognition when Yasser Arafat became its chairman in 1969. Although the territories were now occupied by Israel, they could claim to speak on behalf of themselves without being shadowed by the influence of other Arab countries (Rogan 343).

The Palestinian ideals were brought into the international agenda by a series of attacks that included the hijacking of several passenger flights in order to obtain the media's attention, as well as continuous direct confrontations with the Israelis. The failed attempts of obtaining their independence lead to a collective uprising against the occupation in 1987, which gained momentum in the territories by means of mass demonstrations and civil disobedience. This was going to be known as the first Palestinian intifada.

It was not until 1993 that the world got caught by surprise, when an agreement between Israel and the PLO was announced. The "Declaration of Principles on Interim Self-Government Arrangement", also known as the Oslo Accords, offered a framework for both parties to resolve the ongoing Israeli-Palestinian conflict.

Sponsored by the Norwegian government, the accords established a governmental authority for the Palestinian people of the West Bank and Gaza, which included the Israeli military withdrawal from parts of these areas. The soon-to-be Palestinian Authority was going to gain control over education, health, social welfare, taxation, security, and tourism, for an "interim" period lasting five years. Within this period, permanent status negotiations were supposed to commence for the final resolution of remaining critical issues such as: Jerusalem, refugees, settlements, security, borders, and other issues of common interest (Article 5).

The details regarding the stipulations laid out in the declaration of principles of 1993 were concretized with "The Israeli-Palestinian Interim Agreement on the West Bank and the Gaza Strip " on September 1995, also known as Oslo II. This agreement specified processes such as transfer of authority, security arrangements, economic cooperation, legal matters, and civil affairs, including a wide array of areas ranging from management of religious sites to water extraction and distribution.

Although a remarkable step in finding a solution to the ongoing Israeli-Palestinian conflict, and one for which their representatives were awarded the Nobel Peace Prize in 1994 -Yitzhak Rabin and Yasser Arafat, respectively-; the Oslo accords faced strong opposition by radical quarters on both sides for whom peace was not an alternative. The worst act of retaliation against the accords was the assassination of Prime Minister Rabin himself in 1995, by a radical right-wing orthodox Jew who opposed the idea of giving up the land that God had promised them.

The succeeding change to a right-leaning Israeli leadership, a much more violent second intifada in the year 2000, the stringent blockade on the Gaza strip since 2007, and the PA's effort to obtain unilateral statehood recognition at the United Nations general assembly later this year, make any prospect for a peaceful resolution to the Israeli-Palestinian conflict seem grimmer than ever.

## **2. THE PHYSICAL ENVIRONMENT OF THE WEST BANK**

### **2.1 Land distribution**

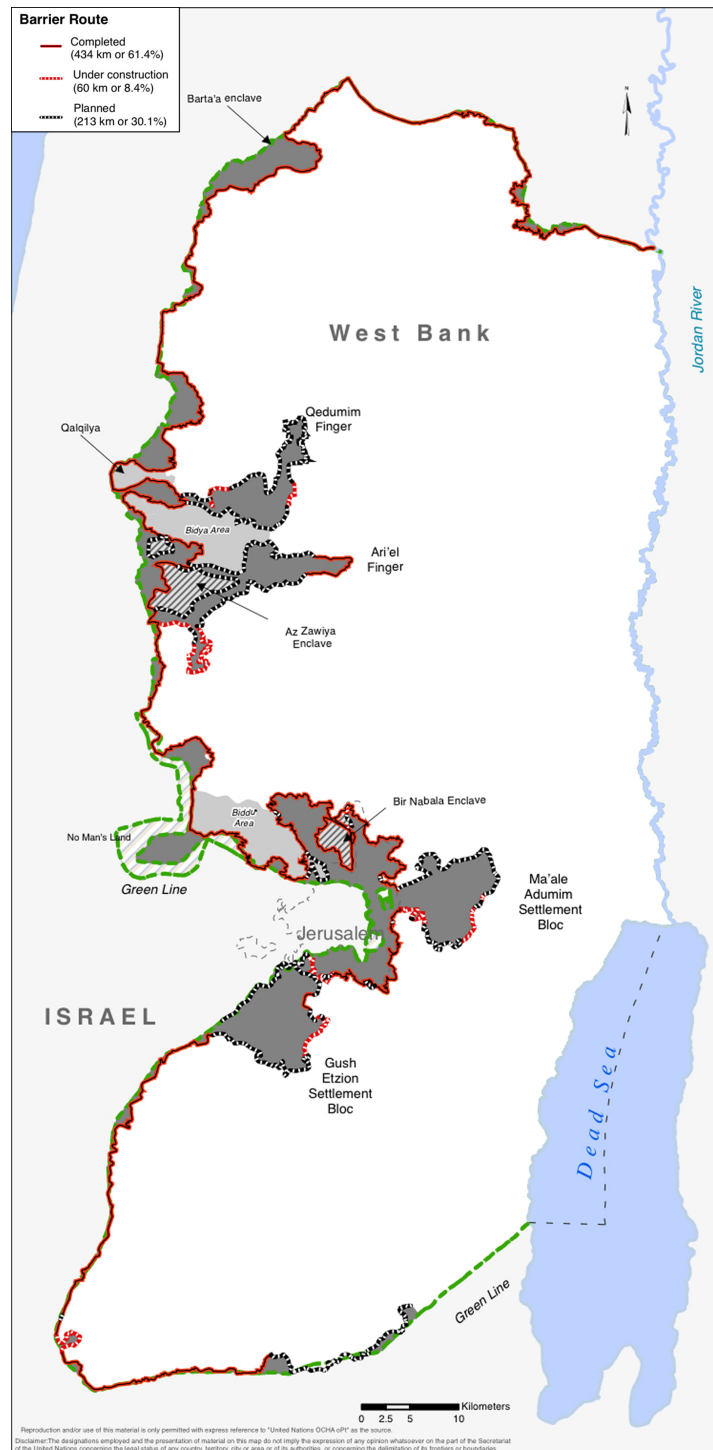
After the first Arab-Israeli war ended in 1949, a series of armistices were signed between Israel and neighboring Egypt, Jordan, Lebanon, and Syria. The physical frontiers of these agreements became the internationally accepted "Armistices line of 1949", commonly referred as the "Green line" (see fig. 5). This armistice line is of special importance because it demarcates the borders of any future Palestinian state, and is officially recognized as such by the UN as well as most countries in the world (UNISPAL "1949").



**Figure 5.** Political map of the West Bank 2011  
 Source: United Nations Office for the Coordination of Humanitarian Affairs

Within the Green line, the West Bank has a total area of 5655 km<sup>2</sup>, making it almost half the size of the emirate of Qatar and less than a third of Israel's total territory (FAO). Furthermore, the Oslo II accords of 1995 subdivided the territories in three different jurisdictions: Areas A, B, and C (refer to fig. 5). Each one of these jurisdictions are under full civil control of either the Palestinian Authority -Area A-, the Israeli Civil Administration -Area C-, or both -Area B-. The controversial nature of this subdivision is the fact that nearly 60% of the West Bank is actually area C, or Israeli controlled, and this arrangement was supposed to be resolved within eighteen months of signing the accords but it has remained in place up to this day (Articles 11 & 13).

Additionally, as depicted in figure 6, the State of Israel approved in 2002 the construction of a separation barrier along the West Bank, which planned route will isolate an additional 9.5% of the territory's land with almost 85% of it being built beyond the Green line (OCHA, "The Wall" 8).



**Figure 6.** Map of the West Bank barrier route projections 2010  
Source: United Nations Office for the Coordination of Humanitarian Affairs

## 2.2 Hydrological conditions

The water resources in the Occupied Palestinian territories consist mostly of groundwater and a small quantity of surface water. According to the Falkenmark water stress index this region belongs to the absolute water scarcity class<sup>1</sup> (Brown 1).

The total internal renewable water resources of the West Bank are estimated at 766 million m<sup>3</sup>/year, while the external water resources are zero. Although the Jordan River provides a total flow of 1578 million m<sup>3</sup>/year of brackish water, this quantity is not considered as an external water source for the Palestinians because they are denied any access to it by Israel, regardless of also being a riparian state (FAO).

The only source of groundwater in the West Bank is the Mountain Aquifer, which is composed of three sub-aquifers: the eastern, the northeastern, and the western basins (see fig. 7). All three of them derive most of their recharge from rainfall and snowmelt on the Palestinian side of the Green line (World Bank 9), although the natural outlets for the northeastern and western basins tend to be located on the Israeli side.

The average natural replenishment and estimated extraction potential from each of these aquifers are detailed in table 1.

**Table 1.** Natural recharge and estimated potential of the Mountain aquifer

<i>Aquifer</i>	<i>Estimated recharge range (MCM)</i>	<i>“Oslo II estimated potential” (MCM)</i>
<i>Western</i>	335-450	362
<i>Northeastern</i>	130-200	145
<i>Eastern</i>	155-237	172
<b><i>Total</i></b>	<b>620-887</b>	<b>679</b>

Source: “Estimated recharge range” from Tal and Abed-Rabbo (24); “Estimated potential” from Article 40 of Oslo II accords.

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<sup>1</sup> Based on the author’s own calculations. Source: [http://www.fao.org/nr/water/aquastat/data/wbsheets/aquastat\\_water\\_balance\\_sheet\\_pse\\_en.pdf](http://www.fao.org/nr/water/aquastat/data/wbsheets/aquastat_water_balance_sheet_pse_en.pdf)



**Figure 7.** Mountain and Coastal aquifers 2002  
 Source: UNEP DEWA

These potentials are long-term averages and recent natural disasters, such as droughts and very high temperatures, have had a direct impact on these numbers. Still, any water related negotiations between Israel and Palestine do always rely in the “Oslo II” estimates as a starting point.

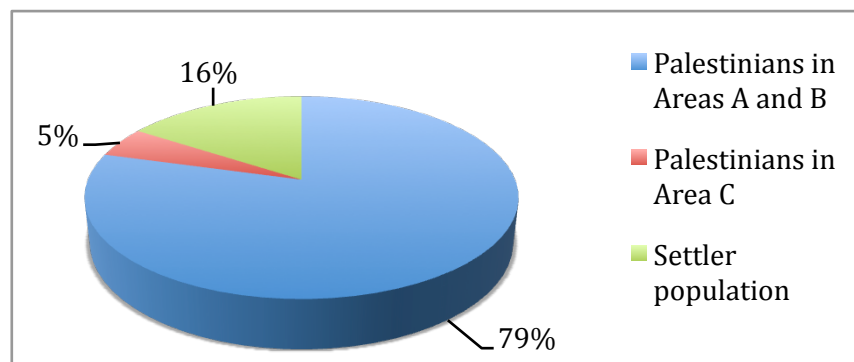
### 3. SOCIO-ECONOMIC SITUATION

#### 3.1 Demographics

The occupied Palestinian territories have an estimated population of 4.2 million inhabitants, out of which 2.6 million reside in the West Bank and 1.6 in the Gaza strip (CIA “West Bank”, “Gaza”).

Additionally, the United Nations Relief and Works Agency for Palestine Refugees in the Near East -UNRWA-, reckons the total refugee population in the oPt to be 1.9 million, comprising almost 30% of the West Bank and around 70% of the Gaza Strip (1). Moreover, while the majority of the Palestinians in the West Bank reside in Areas A and B, it is estimated that as many as 150,000 currently lives within Area C, which is under total Israeli control (UNISPAL “West Bank”).

Finally, although illegal under international law, Israeli settlements in the West Bank keep expanding at an alarming rate and the current settler population in the territories is estimated at around 490,000 people (CIA “West Bank”).



**Figure 8.** West Bank population distribution (in percentages)  
Source: H. Tito

#### 3.2 Economy

The gross domestic product (PPP) of the West Bank was estimated at \$12.79 billion in 2009, with a per capita value of \$2900. Its unemployment rate stood at around 25%, with almost 46% of its population living below the poverty line (Yahoo News).



When compared to Israel's economy, the gap is striking. As a technologically advanced market economy, Israel's gross domestic product is estimated at \$219.4 billion. The GDP per capita of each Israelite is ten times higher than its Palestinian counterpart -est. \$29,800-, while its unemployment rate stands at 6.5% (CIA "Israel").

It is also important to note the heavy Palestinian reliance on foreign aid, which in 2008 stood at around \$1.8 billion or approximately 30% of its GDP at official exchange rate. This situation makes the economy vulnerable to political fluctuations such as the ones experienced during the second intifada in the year 2000 or the Gaza blockade since 2007, when aid distribution was used as a tool to obtain concessions from the Palestinian Authority (Avis 8).

Furthermore, the Israeli government put in place several restrictions on Palestinian movement and access, all of which have had a negative impact in the overall economy. These restrictions are argued based on security grounds and include, but are not limited to: lack of access to land and resources in Israeli-controlled areas, import and export restrictions, and high-cost capital structure (CIA "West Bank").

#### **4. THE ISSUE OF WATER THROUGHOUT THE ISRAELI-PALESTINIAN CONFLICT**

The conflict over water resources has been among the most imperatives problems in the Middle East, and one that currently affects regional and inter-regional public affairs. In the case of MENA, nations tend to take advantage of power differentials in order to make economic or political gains, and this idea can easily be extended for the issue of water resources where geographic position is only one of the several factors that actually determine effective power over this scarce resource (Brooks 59).

In the context of the Israeli-Palestinian conflict, this power differential comes in the form of military control over the occupied territories, by which an effective dominance over freshwater resources seems to have a detrimental effect within the Palestinian population. This is the main argument that this thesis wishes to explore.

Historically, the most relevant dates in reference to the Israeli-Palestinian water conflict are the war of 1967 and the Oslo II accords of 1995. Prior to 1967, water resources in both areas were independently managed, and due to the annexation either by Jordan or Egypt, Palestinians were represented in these affairs by the latter.

Nevertheless, it is important to mention some details regarding water utilization during this period because these facts are frequently used in subsequent agreements between both sides. For example, after its independence, Israel started the development of water sources for which it had gained exclusive access, such as 60% of the total flow of the Jordan River and the extraction of about 300 MCM of groundwater from the Western aquifer (World Bank 4). Additionally, it is estimated that Palestinian farmers had 150 pumps along the banks of the Jordan River, extracting about 30 MCM annually (5).

When Israel occupied the West Bank and Gaza strip in 1967, a multilayered legal system existed in these areas which was a combination of Ottoman, British, and either Jordanian or Egyptian laws. Following the occupation, all these laws were revoked and Israel took absolute control over the water resources by a series of military orders such as (Israeli Law Resource Center):

- a) M.O. 92, issued on August 15<sup>th</sup> 1967, which granted complete authority over the West Bank water resources to the military commander.
- b) M.O. 158, issued on November 19<sup>th</sup> 1967, further prohibited the construction of any water infrastructure without first obtaining permission from the Israeli army.
- c) M.O. 291, issued on December 19<sup>th</sup> 1967, annulled all land and water related arrangements that existed before the occupation.

These laws remain in force today and apply only to the Palestinians and not to Israeli settlers who are subject to Israeli civilian law. Any water related project such as the construction of a new well, its reparation, or the simple connection of pipes, networks, and even rainwater cisterns, must be approved by the Israeli army beforehand (Amnesty International 12).

Additionally, the occupation of the West Bank in 1967 abrogated any water rights along the Jordan River and it is reported that most of the Palestinian pumps along it were destroyed. As stated above, Palestinians are currently denied any access to water resources from the Jordan River (World Bank 5).

In 1982, water management and development was transferred over to the Israeli National Water Company -Mekorot-, which currently controls over 40 wells inside the West Bank and provides water to settlements and Palestinian communities.

The Oslo II accords of 1995 were the next most important event because it included an extensive section on the question of water and sewage in the occupied territories (Article 40). The stipulations incurred in this agreement still rule water management and distribution in the West Bank, with the most important provisions being:

- a) The recognition of undefined Palestinian water rights, which details were left for discussion during permanent status negotiations;
- b) The establishment of a Joint Water Committee (JWC) composed of Palestinian and Israeli representatives, to oversee any “water and sewage related issues”;
- c) A detailed water allocation from the three basins of the Mountain aquifer;
- d) And the transfer of responsibilities in the sphere of water and sewage from Israel to the PA.

The Joint Water Committee is one of only two surviving joint institutions from the Oslo agreement, and its jurisdiction technically refers to all of the West Bank. Also, as stated in table 2, water allocation from the Mountain Aquifer shows a remarkable difference between the Israeli and Palestinian shares, an issue that will be discussed in detail in the following chapter.

**Table 2.** Water allocations from the Mountain Aquifer (MCM)

	<i>Total Israeli (MCM)</i>	<i>Total Palestinian (MCM)</i>	<i>Est. potential (MCM)</i>
<i>Western aquifer</i>	340	22	362
<i>Northeastern aquifer</i>	103	42	145
<i>Eastern aquifer</i>	40	54 (+ 78 for future needs)	172
<b><i>Total</i></b>	<b>483</b>	<b>196</b>	679

Source: Article 40, Oslo II accords.

### **III. LITERATURE REVIEW**

According to the World Health Organization, a minimum of 100 liters per capita per day is required to optimally cover all domestic water needs of an individual (Bartram and Howard 22). While discussions over the recognition of water as a basic human right developed at the UN's human rights council last year, this number has become very much politicized and a benchmark for blaming governments, international agencies, and other institutions in the field, who do not supply their citizens with this basic amount.

When the international non-governmental organization Amnesty International released an extensive report in 2009 regarding the current water situation in the Occupied Palestinian Territories, it stated that Palestinian consumption in the oPt rounds to about 70 liters a day per person –well below the amount recommended by the WHO- whereas Israeli daily per capita consumption was four times as high, at about 300 liters (3). Additionally, it claimed that since Israel's occupation, existing water sources have diminished and calls for such government to put an end to current policies and practices, which arbitrarily restricts Palestinians to availability and access of water.

A couple of months later, a public written announcement by the Israeli Water Authority (IWA) in response to the AI's report, stated that the average annual quantity of natural freshwater available to Israel for all purposes -domestic, agricultural, and industrial- is about 149 m<sup>3</sup>/cap/yr, while that of the Palestinians amounts to almost 105 m<sup>3</sup>/cap/yr. Compared to 1967, the total quantity of water available to the Palestinian has increased from 86 m<sup>3</sup>/cap/yr and these facts alone, they allege, refute the claims made by Amnesty International (2).

If these reports were going to be read independently by any politician, journalist, or a novice interested in the Israeli-Palestinian water conflict, these numbers may seem plausible at first, still confusing at last, without possessing a basic background in hydrological matters. After careful analysis, the IWA letter is found to be misleading in two respects: that of the units of measurement, and that to the extent of water use.

Specifically, while the Amnesty International report claimed the Palestinian consumption in liters per capita per day, the IWA letter replied to this accusation by giving their numbers in cubic meters per capita per year. After a basic mathematical operation is performed, the  $105 \text{ m}^3/\text{cap}/\text{yr}$  value changes to  $287 \text{ l}/\text{cap}/\text{day}$ . Still, this number comes to be very different than the  $70 \text{ l}/\text{cap}/\text{day}$  stated by Amnesty, and here is where the second problem arises.

While Amnesty's claim was based uniquely on domestic water use -the same kind of consumption referred to by the WHO-, the IWA calculation included agricultural and industrial water use. It is obvious that water used in industry and agriculture does not count for human consumption, and although a correct calculation, it does not address the original claim.

The above example is just one of many found in literature pertaining the Israeli-Palestinian water conflict, which data tend to be used for political purposes and presents a challenge for any objective statistical analysis of the situation. Still, as daunting as it seems, this chapter aims to dissect the most relevant data for the purpose of this thesis based on three major sources of information: the World Bank Report in the "Assessment of Restrictions on Palestinian Water Sector Development", the Israel Water Authority report on "The issue of water between Israel and the Palestinians", and the Amnesty International's "Troubled Waters: Palestinians Denied Fair Access to Water".

## 1. A COMPARISON BETWEEN ISRAELI AND PALESTINIAN WATER CONSUMPTION

By being confined to a geographical area no bigger than the German state of Brandenburg, the climatic and hydrological conditions of Israel and Palestine are very much the same. Still, the large disparity in water consumption between these two nations is cause of much controversy, and something I will try to elucidate in this section.

Let's start by analyzing *total* water consumption, which includes residential, agricultural, and industrial uses.

- The IWA report states that Israel's consumption of natural freshwater in 2006 was of 1,211 MCM (16). This number does not include desalinated or treated water which was estimated at 785 MCM (Central Bureau of Statistics), and when added brings the total amount to **1,996 MCM**.
- In the case of the Palestinians in the West Bank, IWA states a total consumption of 180 MCM in 2006 (16), while the World Bank estimates this figure at 154 MCM by 2007<sup>2</sup> (16, 26, 31). The difference may rely on the fact that IWA accounts an additional 13.5 MCM for extractions from unlicensed wells and illegal connections (11-12), an estimate that would bring the World Bank number up to about 167.7 MCM. For simplicity, an average between both numbers will be used, placing the Palestinian total consumption at **174 MCM**.

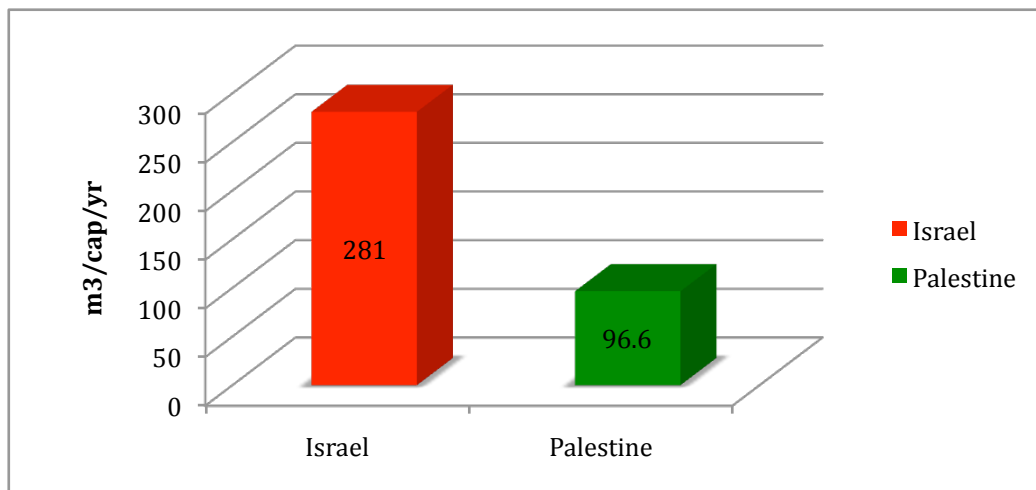
This dramatic difference alone is not of much relevance since territorial and population differences should be accounted for, therefore a calculation of *total per capita* water consumption will follow. As stated in section 3.1 of this thesis, the total population of the West Bank was estimated at 2.6 million in 2010, but because the consumptions stated above were between the years 2006-2007, we will use demographic data from those years (see fig. 9).

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<sup>2</sup> West Bank total consumption = 84.2 MCM (M&I) + 70 MCM (agriculture).

- The Israeli Central Bureau of Statistics estimated that in 2006 the population of Israel stood at 7.1 million people (Haaretz), resulting in a total per capita water consumption of: **281 m<sup>3</sup>/cap/yr**

- IWA estimated the population of the West Bank at 1.8 million in 2006. This number was calculated from an average between 1.4 million determined by the American-Israeli Demographic Research Group, and 2.2 million determined by the Palestinian Central Bureau of Statistics (17). A difference in numbers of almost 800,000 people in a territory where the biggest city has a population of 163,000 is simply ludicrous and must be used with extreme care. Still, even if major international organizations such as the World Bank, IMF, UN, and WHO recognize the numbers provided by PCBS, and regardless of the fact that the “American-Israeli Demographic Research Group” is a dubious and self-declared pro-Israeli group in the US, I will use the figure provided by IWA. The result being **96.6 m<sup>3</sup>/cap/yr** of total water consumption for the Palestinians in the West Bank.



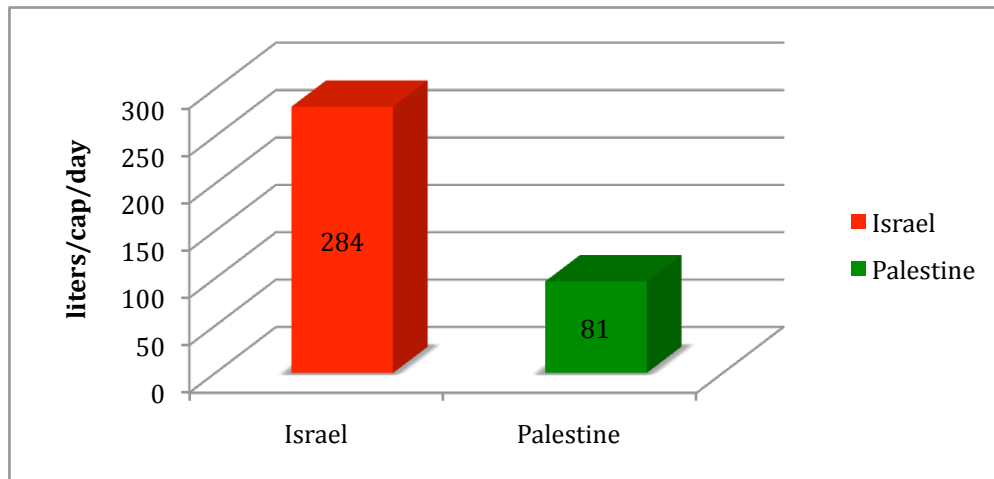
**Figure 9.** Israeli and Palestinian per capita total water consumption. 2006  
Source: H. Tito. See calculations above.



The above calculations make \*clear\* that when it comes to total water consumption, the average Israeli utilizes three times as much water as a Palestinian from the West Bank. Does this number tell us something about the quality of life of the people in terms of water availability? Not at all since this amount includes water used for the agriculture and industry sectors, which is not directly provided to the general population. Also, by having a stronger and more developed economy, Israel's consumption in these sectors is expected to be higher. Therefore, a calculation regarding only domestic water consumption will follow (see fig. 10).

- The Israeli Central Bureau of Statistics calculates that in 2006 their total amount of water used for domestic purposes was 737 MCM. Divided by the above stated population, each Israeli consumes on average **284 liters/cap/day**.

- In the case of Palestinians in the West Bank, it was difficult to find a specific number for total water used for domestic purposes only since this data is usually combined with the industrial sector. The World Bank estimates the actual use at 50 liters/cap/day (14), while AI did so at 70 liters/cap/day (10). The lower amount declared by the World Bank results from taking in consideration water losses and other problems that will be discussed in a different section of this thesis. Additionally, IWA calculates the domestic consumption of Palestinians to be 121 liters/cap/day although this amount seems to include the industrial sector ("WB 2008"). If an average between these different numbers is applied, each Palestinian from the West Bank consumes on average **81 liters/cap/day**.



**Figure 10.** Israeli and Palestinian per capita domestic water consumption. 2006  
Source: H. Tito. See calculations above.

The above calculation, although still needing some refinement, shows Israeli domestic water consumption to be almost 3.5 times higher than its Palestinian counterpart, while supporting the fact that the latter is still below the 100 liters threshold established by the WHO.

## 2. WATER USE AND DISTRIBUTION IN THE WEST BANK

While the previous section focused on the actual water consumption of either Israelis or Palestinians, this section will concentrate on the water sources, distribution, and utilization in the West Bank.

### 2.1 Sources and utilization

According to the calculations in the previous section, the total Israeli water consumption rounds to about 2000 MCM per year. Almost 720 MCM of this water is extracted from the Mountain Aquifer, which recharge zone lies mostly within the West Bank's territory as depicted in figure 7 (Israel Ministry of Environmental Protection). This quantity represents almost 40% of Israel's water consumption and as IWA declares, it is of strategic and vital importance for Israel's economy and national security ("2009 The Issue" 23). We should note that not all of this water is necessarily consumed by Israel since some is actually sold back to the Palestinians through the Israeli water company -Mekorot-.

On the other hand, Palestinian total consumption is calculated to be around 174 MCM, all of which derives from the Mountain Aquifer. Specifically, is estimated that 110.5 MCM is extracted directly by the Palestinians either through wells or springs, 10 MCM comes from unlicensed wells, 3.5 MCM from illegal connections, and about 50 MCM is sold to them via Mekorot (Amnesty International 10).

The World Bank estimates the domestic water consumption of each Palestinians at a low value of 50 l/c/d due the fact that almost a third of the total is lost through leakages and inefficient water networks, pointing out the important difference between the amount of water supplied versus the amount of water being actually consumed (17).

It is also relevant to note that settlements inside the West Bank have an estimated consumption of about 75 MCM per year, out of which 44 MCM are produced from 40 wells located inside the West Bank itself, and the rest being provided from other sources through the Israeli national water supply network (World Bank 5).

Based on these numbers and in reference to Mountain aquifer's estimated potential as established in the Oslo II accords (refer to table 2), Palestinians are extracting around 20% of the aquifer's potential while Israel extracts the balance and over 30%. The World Bank report offers even higher numbers for these extractions, but this fact will be discussed in the section regarding the implementation of the Oslo accords.

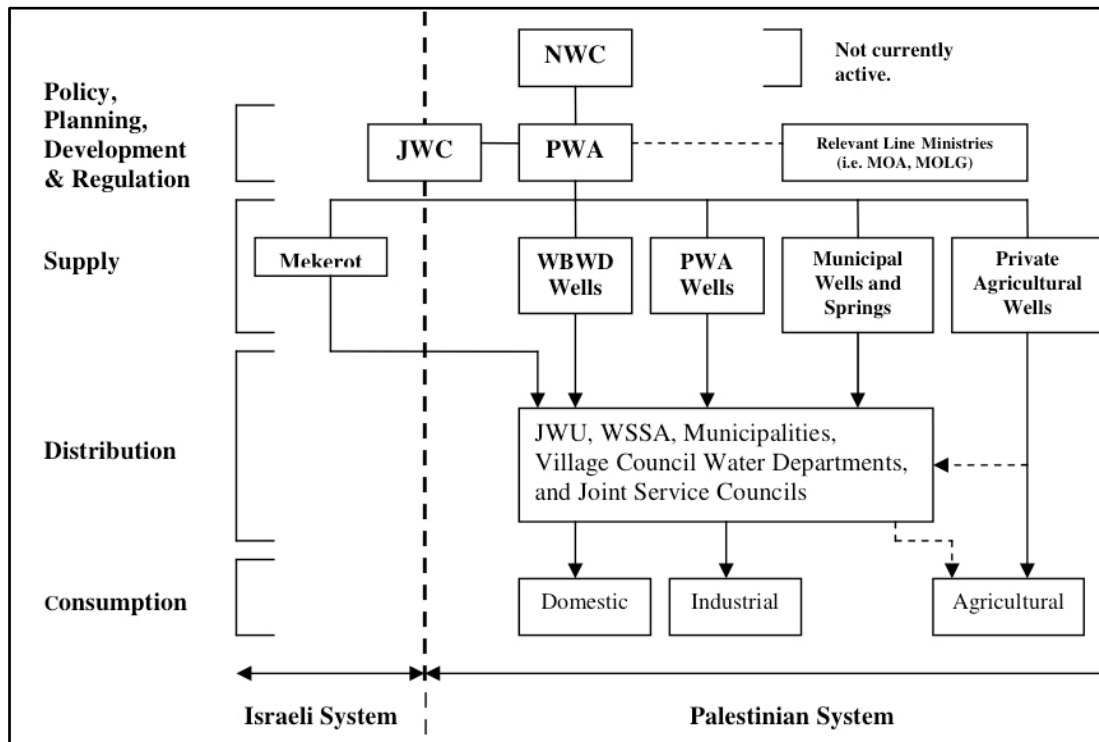
## 2.2 Distribution

Water distribution in the West Bank is extremely heterogeneous and fragmented, and almost absolute consensus exists in the literature blaming this as the main cause for institutional weakness and therefore inefficient water distribution within the territories.

The Palestinian Water Authority is technically the highest office for these matters and it was created after the Oslo II accords for policy, planning, and regulatory roles of water resources within the West Bank. In this respect, Amnesty International alleges that internal problems of mismanagement and corruption, in addition to its inability to provide enough water to Palestinians, has made the PWA a very inefficient institution and quote: *“it is little exaggeration to state that total chaos reigns in the water sector”* (65).

On the service side, water is extracted and distributed through several entities, each of which has its own management structure as well as its own wells. Although technically under the PWA’s jurisdiction, in reality they are all basically independent from each other (see fig. 11). Specifically:

- The Jerusalem Water Undertaking (JWU) provides water to the Ramallah and Al-Bireh district
- The WSSA provides water to the Bethlehem district
- The main cities manage their own water through their municipalities (Jenin, Tulkarem, Tubas, Nablus, Salfit, Qalqilya, Jericho, and Hebron)
- The West Bank Water Department -an institutional legacy from the Jordanian times- provides water to the villages
- And the Israeli Water Company -Mekorot-, which sells additional water to all of the above-mentioned entities



**Figure 11.** Institutional organigram of the West Bank water sector 2008  
 Source: World Bank (11)

According to the World Bank, the bulk of water supply of the -low capacity- fragmented operators is dependent on the single -high capacity- Mekerot, which manages the West Bank’s water scarcity through interconnected systems. This, the report highlights, simply increases Palestinian water dependency on the Israeli company (15).

Also, based on informal interviews with Palestinian stakeholders, the most prominent role of the PWA seems to be the measurement of water extractions from Palestinian wells, which is a function very much stressed onto them by the Israeli side.

Finally, it is relevant to highlight that the management of water resources above mentioned only applies to areas A and B of the West Bank, while the challenges presented to the PWA due to territorial fractioning beyond area C will be discussed in a subsequent section.

### 3. IMPLEMENTATION OF ARTICLE 40 OF THE OSLO II ACCORDS

As mentioned in section 4 of the previous chapter, the Oslo II accords of 1995 included an extensive clause on the issue of water and sewage in the Palestinian territories (Article 40). Covering principles of transfer of authority, yields, extractions, water rights, and governance; it is lauded as one of the most comprehensive and detailed agreements related to the water sector in the Middle East. Nevertheless, this section aims at critically analyzing its implementation and if its current work reflects what it was actually intended for.

#### 3.1 Water allocation and extractions from the Mountain Aquifer

Article 40 had very specific water allocations from the Mountain Aquifer for both Israelis and Palestinians (refer to table 2). The most apparent and striking feature of this allocation is the disproportionate difference between these quantities, which provides 483 MCM for Israel and 196 MCM for the Palestinians.

According to IWA, these numbers were established based on existing water uses, with Israel already extracting its allocated amount at the signing of the Accords (“2009 The Issue” 4). On the other hand, Palestinians were initially allowed to extract only 118 MCM out of the total 196 MCM allocated to them, and the remaining 78 MCM were defined as “future water needs”. Out of these 78 MCM, 28.6 MCM/yr were going to be provided during the interim period for “immediate water needs” (see table 3).

**Table 3.** Palestinian water allocation from the Mountain Aquifer (MCM)

<b>PALESTINIAN ALLOCATION</b>	<b>In million cubic meters (MCM)</b>	
Existing uses	<b>118</b>	
Future needs	<b>78</b>	
	Immediate needs	28.6
	To be developed	49.4
<b>Total</b>	<b>196</b>	

Source: Article 40, Oslo II accords.

Article 40 emphasized the fact that these additional quantities or “future needs” were going to be supplied from the unused eastern aquifer, which development rested on the PWA. Still, according to the World Bank, it has never been clear whether this was an indication of expected future demand over some defined period or simply a statement of intent that these resources would be provided from within the water balance (8).

Additionally, based on calculations made in section 2.1 of this chapter, Palestinians are currently extracting almost 20% of the aquifer’s natural capacity, while Israelis extract the balance and over 30%. The World Bank report of 2009 claimed a similar problem but with very different numbers as seen in table 4.

**Table 4.** Abstractions from the three shared aquifers within West Bank and Israel 1999 (MCM)

Aquifer	“Estimated potential”	Abstractions			Excess over Article 40 allocation		
		Total Palestinian	Total Israeli	Total Abstracted	Palestinian <sup>26</sup>	Israeli	Total over-extraction
Western	362.0	29.4	591.6	621.0	7.4	251.6	259.0
North Eastern	145.0	36.9	147.1	184.0	(5.1)	44.1	39.0
Eastern	172.0	71.9	132.9	204.8	(2.6)	92.9	90.3
<b>Total</b>	<b>679.0</b>	<b>138.2</b>	<b>871.6</b>	<b>1,009.8</b>	<b>(0.3)</b>	<b>388.6</b>	<b>388.3</b>

Source: World Bank (11)

Although it was difficult to find a more updated version of the same table as well as the specific methodology used to obtain these numbers, it is agreed that Palestinian abstractions are below the total allocated water in article 40, while Israelis are abstracting well above their established share.

This difference can be attributed to several factors, with the most relevant being:

- Inefficient management and development of water resources by the PWA
- An almost absolute dependence on international donors for funding of any major water project in the oPt

- Israel's utilization of its dominant position for extracting quantities above their allocated share
- And a very complex process needed to obtain permits for the development of any water project in the territories, which is to be discussed in the following section.

### **3.2 The performance of the Joint Water Committee (JWC)**

The Israeli-Palestinian Joint Water Committee was set up after the Oslo II accords of 1995 in order to implement the Water Agreement and to oversee the joint water aquifers (World Bank 47). It was originally intended to be operational during the 5-year interim period, but it has been functioning almost without interruption for the past 16 years due to the lack of a permanent status agreement between both sides.

It is important to highlight that the JWC is only one of two surviving committees out of 26 created as part of the Oslo II accords (World Bank 47), and it is usually lauded for being functional even during periods of security problems and increased tension between the parties.

According to the water agreement, the JWC should be comprised of an equal number of representatives from each side, and any decision taken by this group should be reached by consensus. The main obligations and responsibilities of the JWC as outlined in article 40 are:

- a) To approve the drilling of new wells and/or increased extraction from any water source;
- b) To approve all water sources development projects and systems;
- c) To determine changes in the extractions if a reduction of resources due to climatologic or hydrologic variability occurs;
- d) And to approve any new water and sewage systems or modification of existing ones



Usually held as an example of Israeli-Palestinian cooperation, the JWC must be scrutinized in two respects: that of being a symmetrical representative body for both Israelis and Palestinians, and that of being impartial when approving proposed projects by either side.

In relation to the first one, Amnesty International harshly denounces that there is no actual parity of power and control between both sides on the decision making process of the JWC (28). While IWA does not pronounce itself on the matter, the World Bank support AI's claim by stating: *"the JWC has not fulfilled its role of providing and effective collaborative governance framework for joint resource management and investment... The JWC does not function as a joint water resource governance institution because of fundamental asymmetries – of power, of capacity, of information, of interests – that prevent the development of a consensual approach to resolving water management conflicts"* (51).

Although the author of this thesis was not able to attend any JWC meeting in order to verify the above statements, the stronger Israeli influence in any decision-making process was taken for granted by most scholars and experts in the field during the informal interviews held for as part of this research process.

Still, we could infer a disparity in relation to the Palestinian negotiation capacity simply based on the low approval rates for any water related project in the West Bank. Specifically, while IWA reaffirmed that *"the committee approved nearly ALL the projects that were submitted for its approval, even beyond the obligatory ones included in the Water Agreement"* ("2009 The Issue" 5), in reality, as depicted in table 5, only 57% of projects presented to the JWC have been approved and 34% were still pending between 1996-2008 (World Bank 48)

Of the 202 well drilling projects, only 65 (32%) were approved by the JWC, and among the rejected ones 82 were drilling projects presented by the PWA as part of the agreed quantum under article 40 (49).

**Table 5.** Status of Palestinian projects submitted to JWC 1996-2008

Status	Number of projects	% of total
Approved	236	57%
Not approved	22	5%
Pending	143	34%
Approved by JWC/ not approved by C.A.	7	2%
Approved/ no possibility for execution	7	2%
Withdrawn by Palestinian side	3	1%
Total submitted	417	100%

Source: World Bank (49)

It is also important to mention the fact that approval by the JWC does not necessarily imply swift implementation. The reason for this lies in the fact that some projects require additional permits from the Israeli Army, and also because international donors have been hesitant about providing funding for projects that deal with disputed issues such as the groundwater from the Mountain Aquifer (World Bank 61).

On the other hand, the Israeli side states that the non-approved Palestinian projects tend to be rejected or delayed because they are poorly prepared, breach the understanding of article 40, or they do not meet other policy criterion (“2009 The Issue” 5).

Finally, it is important to mention that the JWC has jurisdiction over all areas in the West Bank, and Joint Supervision and Enforcement Teams (JSETs) were set up in order to monitor water extractions from Israeli and Palestinian wells. The JSETs are supposedly comprised of representatives from each side in order to detect any infringement on the water agreement (sch. 6). In reality, as Palestinians are not allowed access to area C of the West Bank, their teams are not able to verify extractions made by settlements or Mekorot, and must rely on the data provided to them by the Israeli teams. These specific limitations caused by movement and access (M&A) restrictions within the West Bank will be discussed in the next section.

#### **4. IMPLEMENTATION CHALLENGES IN AREA C OF THE WEST BANK**

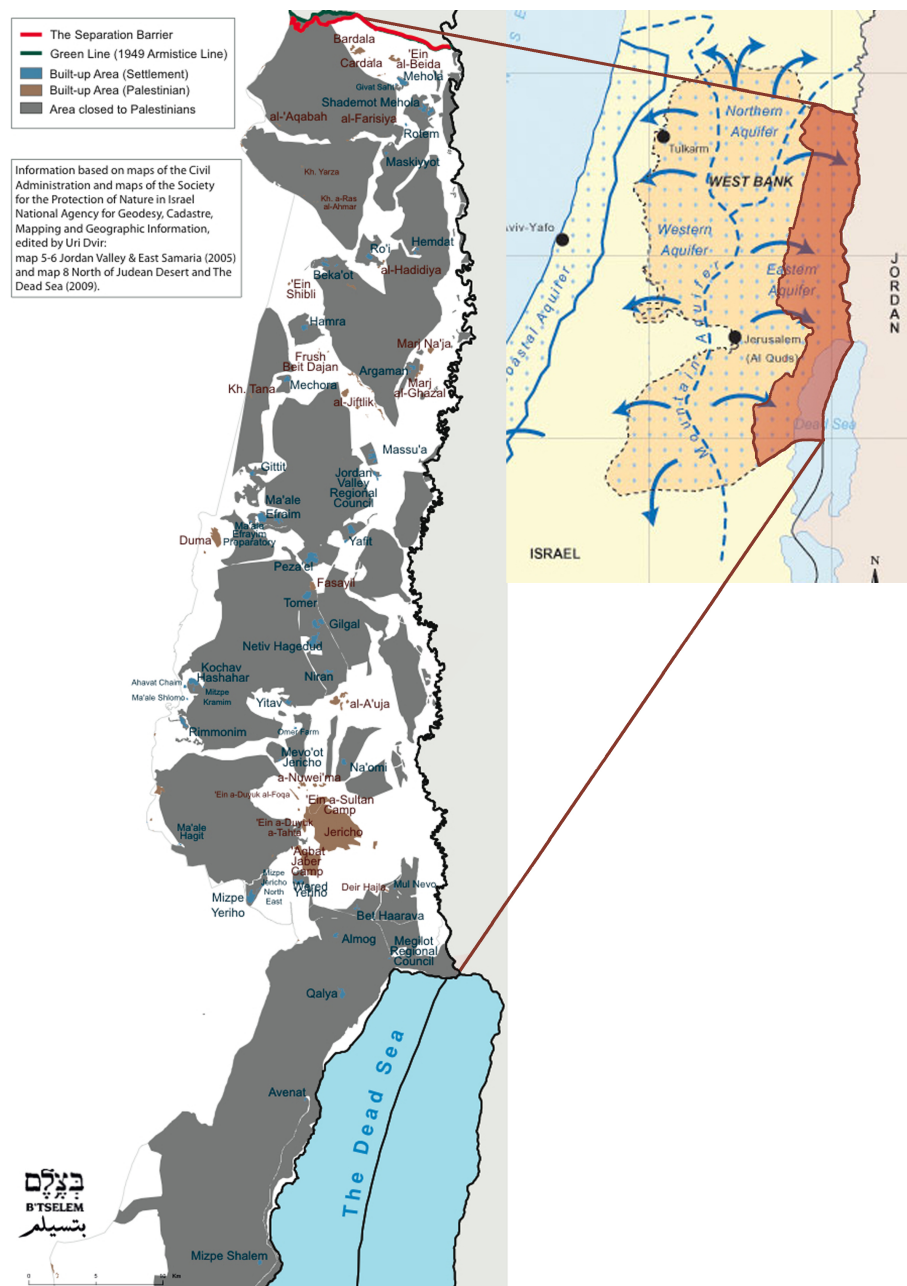
As stated previously, almost 60% of the West Bank is currently under full Israeli control as established during the Oslo accords of 1995. This territory, also known as Area C, is usually off-limits for the Palestinians therefore creating big difficulties for access and movement within the West Bank.

The Civil Administration –CA– is the Israeli governing body that operates in the lands of Judea and Samaria (biblical names by which the West Bank is referred to in Israel) and has jurisdiction over security and civil matters in the territories. It works in close collaboration with the Israeli Army and provides, among many other things: access permits from the West Bank to Israel, travel permits for within the West Bank, and the approval of any infrastructure related project in Area C.

As for the water sector, one of the main challenges caused by this political division is the fact that any project must always obtain a second approval from the CA if it touches on area C. For example, even if a simple water pipe is needed to connect two “Area B” Palestinian villages and this pipe would have to cross 1 meter of Area C, the whole project must be placed on hold until permission is given. Table 5 above provides information on seven projects that were approved by the JWC but refused by the Civil Administration, whose arguments are generally based on security grounds.

Also, as mentioned in the demographics section of this thesis, it is estimated that as many as 150,000 Palestinian currently live in Area C of the West Bank. These inhabitants obtain water neither from the PWA nor any other Palestinian provider due to the fact that these institutions have no authority whatsoever over Area C, therefore being reliant on the Civil Administration for the provision of this scarce resource.

Finally, it is relevant to mention that while IWA accuses the Palestinians of defaulting the water agreement by “not developing and using, quite deliberately, the groundwater resources in the eastern aquifer that were made available to them in the water agreement” (“2009 The issue” 22), we must realize that most of the “eastern aquifer” actually lies in closed military areas of the Jordan valley where Palestinians are not permitted access and the potential for well development is best due to hydro geological conditions (see fig. 12).



**Figure 12.** Map of areas in the Jordan Valley and the northern Dead Sea closed to Palestinians in relation to the Mountain Aquifer  
Source: B'Tselem. Adapted by author

So far we have concentrated on the analysis of the water sector in the West Bank by reviewing the most comprehensive and relevant available literature. Based on this analysis, the main findings are summarized below:

- a) In terms of domestic water consumption, an average Israeli currently utilizes 3.5 times as much water as its Palestinian counterpart.
- b) The current water extraction from the Mountain aquifer amounts to almost 20% on the Palestinian side, while that of the Israelis covers the balance and over 30%.
- c) The mismanagement and fragmented situation of the Palestinian Water Authority allows for an inefficient use and distribution of the already scarce resources within Areas A and B of the West Bank.
- d) The Joint Water Committee has not provided an effective collaborative governance framework due to asymmetries in power, capacity, and information, which works in detriment of the Palestinian representation.
- e) The implementation of Palestinian water projects has posed a huge challenge due to M&A restrictions placed on Area C of the West Bank.

These findings make clear the existence of an inequitable distribution of water resources between Israel and the West Bank, where the former takes advantage of its dominant military position in order to have a higher influence in the extraction, use, and distribution of these resources. Also, we could safely conclude that the inefficient management of limited resources by the Palestinian Water Authority further exacerbates this situation.

This theoretical background has set the foundation to further understand the concept behind the research project carried out and something that will be the scope of the following chapter.

## **IV. RESEARCH DESIGN AND METHODOLOGY**

### **1. RATIONALE**

The literature review allowed for a cogent and concise analysis of the current water situation in the West Bank. Nevertheless, how does this inequitable situation translate into reality? How is this water scarcity actually reflecting on the Palestinian society? Are these numbers a reliable indicator of current “water livelihoods” in the West Bank? The answer for these questions cannot easily be deduced from the above-presented data, and therefore a different and more practical approach must be given to the issue.

The need for this pragmatic approach was further encouraged by a recent visit to the Palestinian city of Ramallah. While water scarcity was expected to be a major problem all over the West Bank, here it did not seem much of a difficult situation due to an average water consumption of 130-150 liters per person a day (World Bank 59). Although well above both: the 80 liters average consumption in the West Bank, and the minimum 100 liters recommended by the WHO; we should emphasize that this consumption still represents a third of the Israeli average. On the other hand, it was a major surprise to find out that some villages in the southern part of the territories are able to manage only with 20-30 liters per day (17), a quantity almost at the verge of the minimum reserved for emergency situations experienced in conflict areas such as Darfur or flooded Pakistan. These striking differences in water consumption within the West Bank are easily lost in the myriad of data and averages; still, it is of important relevance if we are to even grasp the actual impact water scarcity has in the population.

Therefore, a research methodology was developed in order to understand the relationship between three main factors: water scarcity, conflict, and the accurate representation of data. This research project aimed at doing so by conducting an investigation in the most water-vulnerable communities of the West Bank and by exploring the following research questions:

1. How do these communities cope with water scarcity and how do they perceive their current situation?
2. Can we draw a direct visible relationship between water scarcity and the Israeli occupation? Otherwise, could the same relation be drawn arising from Palestinian political ineffectiveness?
3. Does a big disparity in water consumption exist among different Palestinian communities? If so, how accurately does the current data depict this situation?

The following sections will describe in detail the methodology used for this particular investigation, the selection of communities, and the data collection process.

## **2. METHODOLOGY**

### **2.1 Overview**

According to Taylor & Bogdan (7), qualitative methodology refers in the broadest sense to research that produces descriptive data – people’s own written or spoken words and observable behavior. This approach was chosen to be the most appropriate one for the purpose of this research because it tackled exactly what this study aimed at understanding: the relationship between the factors in discussion, and how people’s perceptions reflected these relationships on themselves.

In other words, while on a quantitative level water scarcity was proved to be a major problem in the West Bank, a qualitative approach was needed to understand how this scarcity was actually transposed and perceived by the general population. Also, while responsibilities of the situation could be attributed to the leaderships on both sides, the most affected populations may simply perceive it as a dominant one-sided condition, which reliability can only be proved by utilizing a qualitative approach.

Specifically, a total of six water-vulnerable communities were selected using a specific set of criteria provided by the Water Poverty Index methodology. These criteria allowed for a comparison in which two communities shared all but one of the variables, therefore simplifying the analysis substantially. Additionally, interviews were conducted with residents and local authorities in each of the selected communities for a deeper analysis of their current situation.

Along with primary data, the researcher also made use of secondary sources in the form of informal interviews with several professionals and academics in the water sector. These allowed for a better understanding of details that were not found in the literature and/or within the communities themselves.

## **2.2 Research design**

The theoretical framework of this research was provided by grounded theory, in which a preconceived hypothesis did not exist but one emerged from the systematically gathered data of the research process (Corbin & Strauss 12)

The research questions provided a reference point on how to approach the research design, still, preconceived assumptions were avoided and even the findings from the literature review were placed into scrutiny.

When the author of this thesis initially set foot in the West Bank in early March 2011, a basic timeline for completion of the research project was already in place. Nevertheless two important factors still needed to be decided: the specific tools for data collection, and the selection of the communities to be visited.



The project was estimated to have an initial duration of three months. The first month was going to be devoted to pre-field work by means of informal interviews, the selection of the communities, and the development of data collection techniques. The next four weeks were expected to be fully dedicated to fieldwork and data collection. Finally, the last four weeks in the territories were spared for data analysis and further interviews in case some details still needed clarification.

In practice, the pre-field work and the fieldwork took much more time than expected, leaving almost no space for data analysis while still in the West Bank. This time mismanagement was mainly due to the following factors that were unaccounted for:

- a) A longer than expected waiting time to set up meetings with academics, professionals, and authorities in the water sector;
- b) Difficulties of movement and access experienced by the researcher himself;
- c) And language constraints, which caused dependency on the availability of a suitable translator.

The most appropriate tool for data collection was selected to be *open-ended interviewing*, by which general areas of information were gathered while allowing for a degree of freedom and adaptability in getting the information from the interviewees. Although a template questionnaire was prepared to serve as a guideline for the interviews, this kept changing as the researcher started recognizing the issues that were most prevalent and relevant to be discussed. Annex 1 of this thesis provides the original templates used for this purpose.

Specifically, two different sets of questionnaires were developed: one aimed at local authorities, and one aimed at local residents. Although very similar in content, a technical emphasis was given to the former, while a more personal approach was given to the latter. This allowed for a more effective and tailored gathering of data, which resulted useful at the time of data analysis.

On the other hand, the selection process of the communities to be visited presented one of the main challenges for the research design. This selection was mostly based on data presented by the Applied Research Institute of Jerusalem (ARIJ) in its report titled: *“Domestic Water Vulnerability Mapping in the West Bank”*. Interviews with Jane Hilal, the author of this report, in addition to full access to the original document were of critical importance for the continuity of this project. Still, due to copyrights issues, access to the exclusive database was not possible therefore slowing the selection process substantially.

Additionally, two other factors needed to be taken in consideration at the time of selection: that of the number to be visited, and that of the issue of access. First, by being a self-funded venture, financial constraints restricted the number of places that could possibly be visited. This was further relevant due to the fact that some communities were located in remote areas, making it impossible to arrive without private transportation and therefore increasing the expenses considerably.

Also, due to the unique political situation of the West Bank, some areas were quite difficult to reach. Checkpoints, military closures, road closures, and even road prioritizations (settler-use only), were some of the deterrents taken in consideration during the selection.

In spite of these complications, the researcher was able to access six of the most water vulnerable communities for further analysis, which selection will be described in detail in the following section.

### 2.3 Community selection

The Water Poverty Index (WPI) is a holistic tool designed to contribute to more effective water management, and is unique in the sense that measures water scarcity by a combination of physical and social factors placing more emphasis in the lack of access rather than abundance of resources itself. It uses a composite index, which combines a series of components (resources, access, capacity, use, and environment), and each of these components is calculated by combining a series of indicators (Lawrence, Meigh, and Sullivan 4).

ARIJ's publication: *"Domestic Water Vulnerability Mapping in the West Bank"*, attempted to determine which areas in the territories are the most water-vulnerable not only in physical but also in socio-economic terms, by utilizing the methods developed by the Water Poverty Index. This specific kind of water mapping proves useful for following reasons: First, it provides a visual tool to represent spatial differences in vulnerability; second, the composite nature of index allows for the mapping of each component separately; and finally, specific elements related to the availability and integrity of water resources may be plotted onto the map (6).

The information presented in this publication was the one guiding the selection of communities to be analyzed, and a specific procedure for this matter was developed. To begin with, it was decided that the communities were going to be selected in pairs. This selection took in consideration the following WPI indicators: connection to a water network, percentage of income spent on water, domestic water use per capita, incidence of water borne diseases, WASH score risk, and geopolitical zone. Based on these indicators, three pairs of communities were singled out in which all but one of the indicators differed. It was expected that this approach would allow for the analysis of this one single parameter, which the researcher had control over.

It is important to mention that although a very scientific approach, the overall qualitative basis of the research was kept by applying the same open-ended questionnaire in every single one of the six communities. This kind of selection simply allowed for an additional factor to be analyzed at the researcher's discretion.

### **2.3.1 Bardala – Ein El Beida**

As illustrated in figure 15, these communities are located in the governorate of Tubas and are physically very close to each other. Although being at lower risk according to the WASH risk assessment, they do show relatively low water consumption per capita (0-55 l/c/d) (see fig. 14).

Additionally, by being located in the Jordan valley, these communities are like tiny enclaves of “Area B” surrounded by swaths of Area C, with several near-by agricultural settlements. These facts alone make them a very interesting case to be analyzed, but it was their connection service that actually sparked the interest of the researcher.

Specifically, although being physically close to each other and sharing all of the above-mentioned variables; ARIJ's profiles indicated that while Bardala was being provided water by Mekorot (8), Ein El Beida was being provided so by the PWA (8). This fact, it was expected, would allow us to identify the differences in service between Mekorot and the PWA, and examine if this difference may have any relation to the low domestic water consumption per capita.

### **2.3.2 Maghayir Al' Abeed – Az Zubeidat**

The most relevant feature of these two communities is the fact that both are located in Area C of the West Bank. In other words, a comparison between them would allow us to see at what extent does the Israeli occupation has a direct impact on the water situation in these communities.

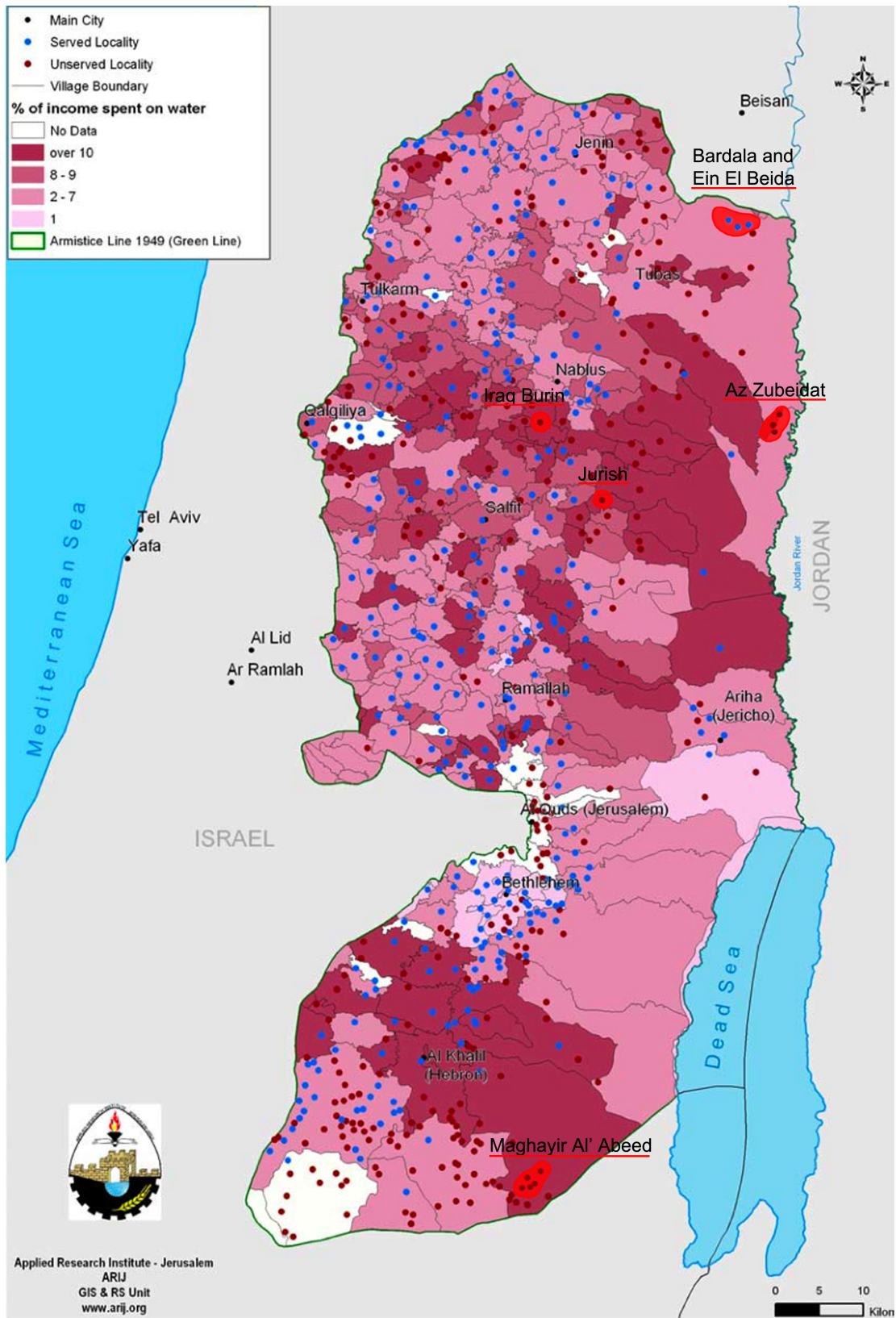
Also, it was interesting to observe that while the latter is connected to a water network and the former is not, the literature states that Maghayir Al'Abeed has an overall higher water consumption than Az-Zubeidat (see fig. 14). Somehow counterintuitive especially considering that Maghayir Al'Abeed is considered at higher risk according to the WASH assessment; this was thought to be a good reason to do a comparative case between these communities.

### **2.3.3 Jurish – Iraq Burin**

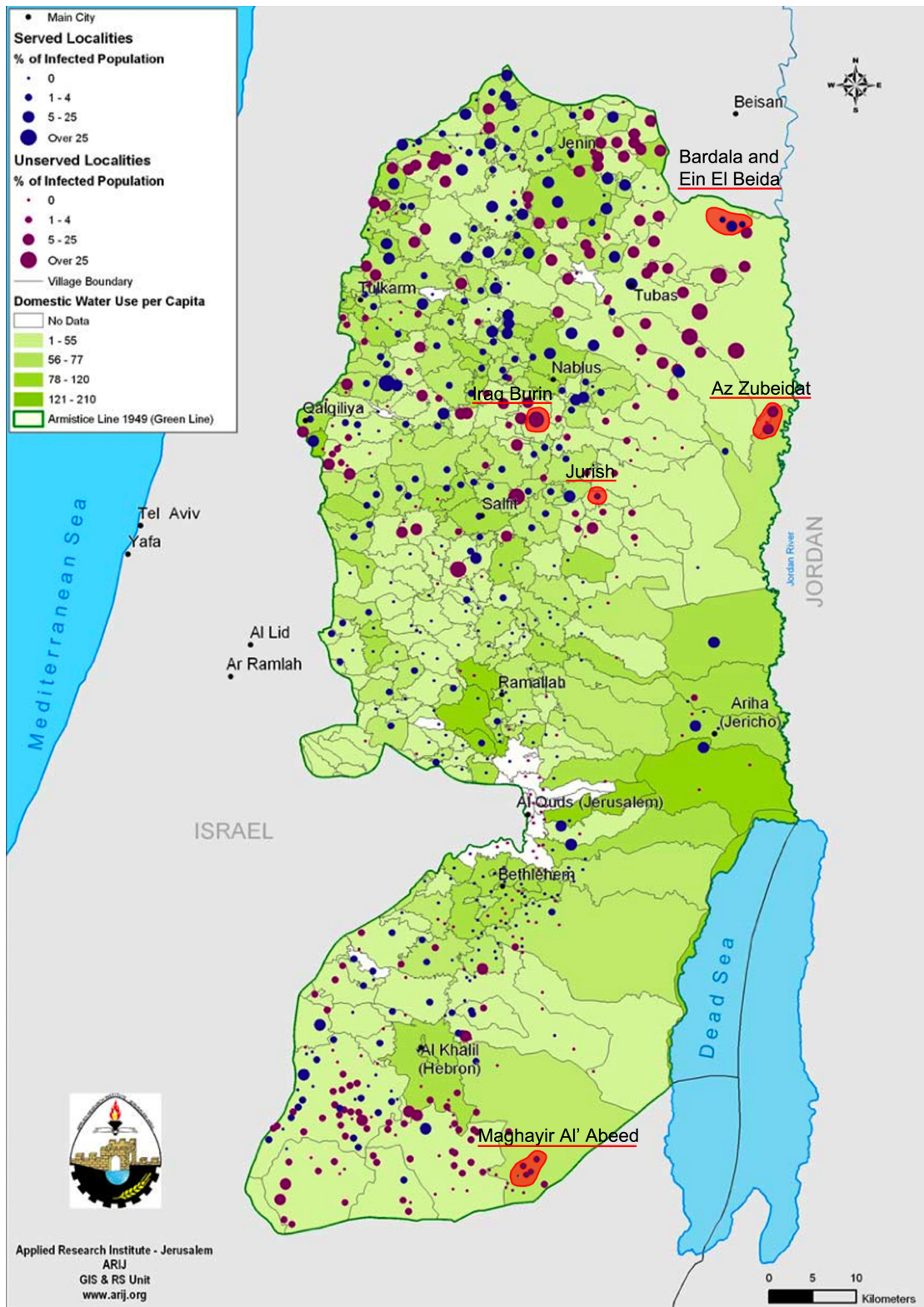
In addition of obtaining one of the lowest positions in the overall ranking of water vulnerability, the most relevant feature of these communities is the fact that both are unconnected to the water network (see fig. 14).

Also, by having very low domestic average water consumption, as well as very high percentages of income spent on water; the only remarkable difference between them is the fact that Jurish is considered a community at higher risk than Iraq Burin according to the WASH assessment (see fig. 15).

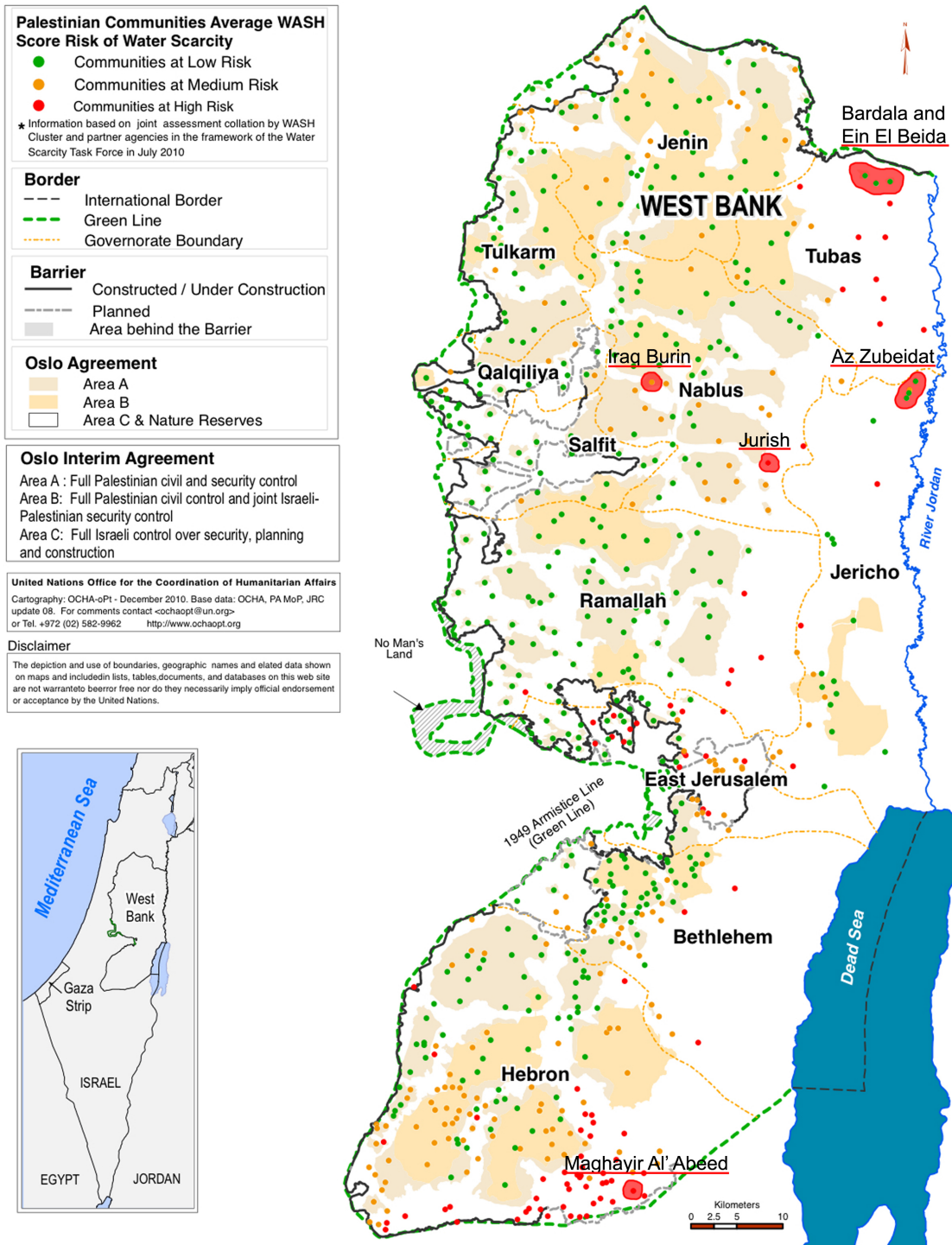
What is the feature not being portrayed in the WPI that actually makes one community at more risk than the other? By sharing almost every other variable, the answer to this question was the main reason for which a comparative case between these communities was decided.



**Figure 13.** Percentage of income spent on water by village boundary, West Bank  
 Source: Applied Research Institute of Jerusalem ("Domestic" 32). Adapted by author



**Figure 14.** Water use and water borne diseases, West Bank  
Source: Applied Research Institute of Jerusalem (“Domestic” 33). Adapted by author



**Figure 15.** WASH vulnerability mapping of communities at risk of water scarcity, West Bank

Source: United Nations Office for the Coordination of Humanitarian Affairs.

Adapted by author



### 3. Data collection

The interviewing process for this research project took place between the months of April and May of 2011. As table 6 depicts, it lasted almost 4 weeks for a total of six visited communities and 14 interviewed people.

**Table 6.** Data collection schedule and number of interviews

Name of community	Date	Number of people interviewed	
		<i>Authorities</i>	<i>Residents</i>
Iraq Burin	April 21 <sup>st</sup> , 2011	1	1
Maghayir Al' Abeed	April 27 <sup>th</sup> , 2011	0	2
Jurish	May 4 <sup>th</sup> , 2011	0	2
Bardala	May 11 <sup>th</sup> , 2011	1	2
Ein el Beida	May 11 <sup>th</sup> , 2011	1	2
Az - Zubeidat	May 18 <sup>th</sup> , 2011	1	1

Source: H. Tito

The researcher spent an average of two days in each community, and although personal interviews were always preferred, in some instances group interviews had to be carried out. This was the case for the communities of Bardala and Ein el Beida, in which one single meeting with the local authorities, residents, and water professionals from both villages took place.

Also, while an attempt was made to have an equal gender representation, most of the interviews were carried out with men, a situation that could be attributed to cultural and religious differences in an otherwise patriarchal society.

The only communities in which the researcher was not able to secure interviews with local authorities were Maghayir Al' Abeed and Jurish. In the first case, by being a very small village consisting mostly of extended family and in a very difficult political situation, the later was not even attempted. In the case of Jurish, the mayor of the town was not available at the time of the visit, and a subsequent return for a meeting was not possible.

The data was recorded by means of hand written notes, which the interviewer took parallel to the conversations. The information was catalogued by having the following information at the top of each page:

*Community name:*

*Name of the person:*

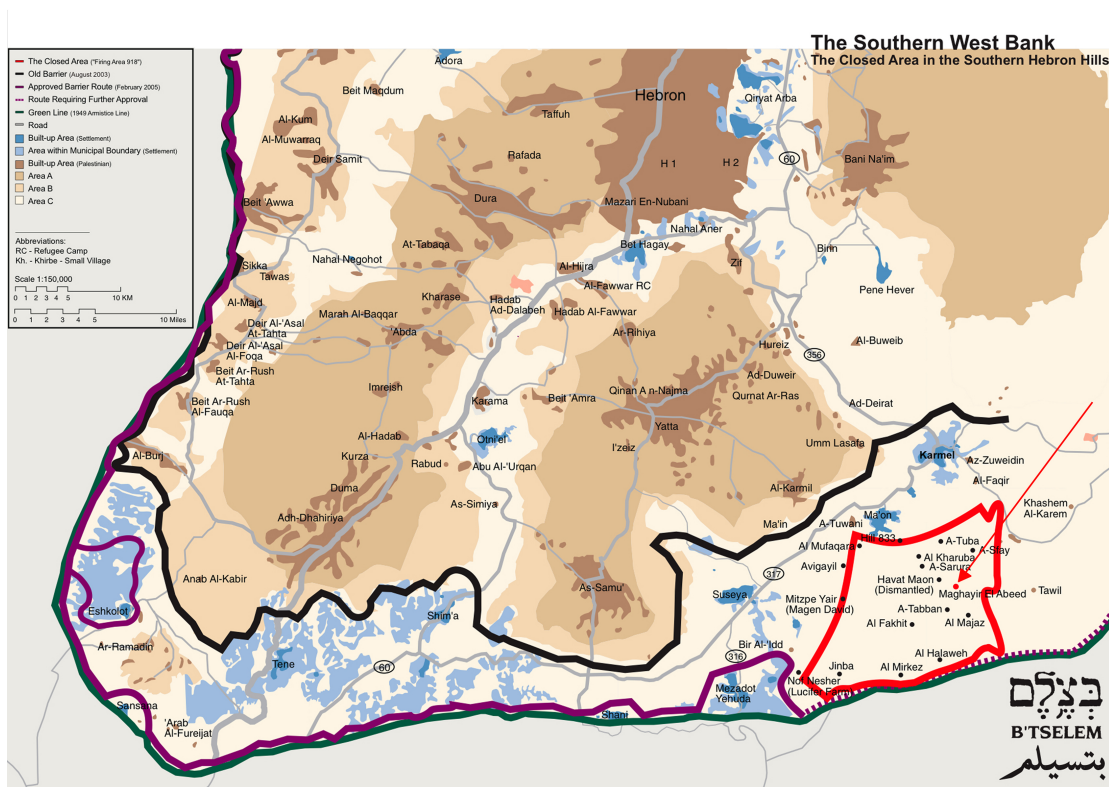
*Administrative division of household:*

*Household size:*

*Date:*

Additionally, because very few of the interviewees were proficient in English, all the meetings required the presence of a translator. This turned out to be one of the major challenges experienced by the researcher due to the reliance in the availability of a suitable one every single time. Still, through personal contacts and support from different organizations, no meeting was ever cancelled due to this reason.

In terms of accessibility, the most challenging location to be reached proved to be the community of Maghayir Al' Abeed. As seen in figure 16, this community is located in the southern Hebron Hills of the West Bank which is a remote region usually catalogued as ground zero for settler violence. Additionally, the village is situated in a closed military area known as "Firing Area 918", which is technically off-access without proper permits. Nevertheless, with support from the "Christian Peacemaker Team" of the near by town of Tuwani, this community was eventually accessed.



**Figure 16.** Map of the Southern West Bank  
Source: B'Tselem. Adapted by author

In the case of the communities located in the Jordan Valley (Bardala, Ein el Beida, and Az-Zubeidat), transportation was the major constraint on access since most of this territory is classified as Area C and the majority of the land is dedicated to agriculture. In other words, without a proper contact person and/or private transportation, access was almost impossible. However, this was eventually feasible by joining working teams from the Palestinian Hydrology Group (PHG) and the Japan International Cooperation Agency (JICA), who were supervising agricultural projects in these localities.

Finally, it should be noted that the people interviewed for this research project not only showed its predisposition to collaborate from the beginning, but they were more than willing to share as many details as possible in order to get their story across. This facilitated tremendously the work of the researcher, and although not pleasant accounts at all times, each one of them was always a positive experience.

## **V. RESULTS AND DATA ANALYSIS**

This chapter will go into detail with the most relevant information gathered from the interviews, and will attempt to address the most important questions presented in the previous chapter with an in-depth analysis of the situation.

### **1. INDIVIDUAL COMMUNITY-BASED RESULTS**

#### **1.1 Az Zubeidat**

Interviews in this community were carried out with a local resident and the mayor of the village. Agriculture was found to be its main economic activity, and they are currently connected to a water network provided by Mekorot (current price: 3 NIS /m<sup>3</sup>).

Although being of very good quality, the quantity of water available is limited by service, which runs only for 2 hours every night. According to a resident, the amount of water is not enough for personal use but they are able to manage after all. Also, both interviewees emphasized the fact that their economic activity is severely limited by this low water allocation.

An additional source of water exists in the form of a local well that is mostly used for agricultural and not for drinking purposes. Still, according to the mayor, the output of this well has severely diminished from an average of 90 m<sup>3</sup> to almost 30 m<sup>3</sup>. Although details about this reduction were not further verified, he blamed it on the surrounding Israeli wells, which are much deeper and have caused the water table to drop considerably.

When asked about the major problems being faced by their community, both interviewees strongly asserted that their biggest challenge relates to water borne diseases. This is attributed to the lack of a sewage network, overcrowded housing, and limited water supply.

Permission from the Civil Authority was requested in order to repair the existing well and to build a sewage treatment plant, but both requests were denied. Also, because of Area C regulations, housing expansion is not allowed which explains the overcrowded living conditions.

Finally, when asked about any other additional constraints, the most relevant points at issue were: lack of access to solid fertilizer due to Israeli barring on this material, export banning, limited access to the internal Palestinian market, and the expansion of settlements which are taking over their land and limit their range for cattle grazing.

## **1.2 Bardala – Ein El Beida**

As mentioned in the previous chapter, these communities will be taken in consideration together because a single meeting was carried out with residents, authorities, and professionals in the water sector from both villages.

Located in Area B of the Jordan Valley these communities are connected to the water network, which is currently provided by Mekorot. It is important to note that opposite to what the literature states, Ein el Beida was not provided water by the PWA. Also, it was found that the main economic activity of the villages is agriculture, for which almost 90% of the population is dependent on.

The current water price is set at 0.5 NIS per cubic meter with a specific water allocation given to each of the villages, which price goes up to 2 NIS per cubic meter once this threshold is surpassed. According to the authorities, an initial agreement with Mekorot was made for water pricing set at 0.14 NIS per m<sup>3</sup>, but the latter has gone up due to reasons that were not specified.

When asked about the major problems being faced by their community, consensus was reached in the following topics: water restrictions, material restrictions, and water pricing. Domestic water availability did not seem to be much of a problem, and emphasis was always placed on water used for agriculture.

It was asserted by several field professionals that agricultural settlements have preferential access to water and that some of them did not have to pay for this service. Although the researcher could not verify this information, it was an issue that arose in every single subsequent informal interview held with relevant stakeholders.

An additional source of water exists for Ein El Beida in the form of a natural spring; still, this one is only utilized for livestock consumption due to its low water quality. Furthermore, it was stated that the region used to be provided by 6 natural springs, all of which have disappeared due to the lowering water table caused by deep Israeli wells.

Finally, when asked about additional constraints, the most relevant points at issue were: export banning, water limitations, and lack of access to solid fertilizer due to security restrictions.

### **1.3 Iraq Burin**

Interviews in this community were carried out with a local resident and the president of the village council. Although technically located in Area B, some of the houses within its limits fall in Area C due to its closeness to the settlement of Har-Bracha. This was the case for one of the residents, who at the time of the interview had already three demolition orders over his house.

The village is not connected to a water network and currently obtains this resource from the following sources: rainwater, tanker water, and natural spring. The rainwater is collected by underground cisterns, which are present in every single house. Tanker water is delivered from a different Palestinian village, which in itself buys this water from one of the surrounding settlements. Finally, water from the natural spring is taken to every house either by donkey or small tractors.

While spring water is used for drinking due to its very high quality, tanker and rainwater are used for other domestic chores (bathing, washing, etc.). According to a local resident, the summer season is the most challenging one because they basically have to rely on purchased water. The current price is set to about 20 NIS per cubic meter, and over 10% of their income can easily be spent in this good.

When asked about the major problems being faced by their community, both respondents declared that the near by settlement of Har-Bracha is their major difficulty (see fig. 17). The local resident showed concern regarding settler violence towards his family, which he had to leave alone while he was at work. Also, he stated that military raids in which soldiers utilized his house as a watchtower for the village were common. On the other hand, the president council emphasized that during stressful political times such as the second intifada, even water from the natural spring was difficult to access.



**Figure 17.** Iraq Burin limits and settlement of Har Bracha on top  
Source: Fields, G. (9)

#### **1.4 Jurish**

The community of Jurish is located in Area B of the West Bank, within the governorate of Nablus and next to the settlement of Migdalim. As mentioned in the previous chapter, two residents were interviewed for this project but a meeting with the local authority was not possible.

The village itself is not connected to a water network and their main water sources are rainwater and tanker water. While one of the residents stated that rainwater is used only for domestic chores while purchased water for drinking, the other one stated that these two were combined and used for all purposes. An additional source for the village exists in the form of a well, but its low water quality restricts it for plant-use only.



Rainwater is collected by underground cisterns present in every house, while tanker water is bought from the near by settlement. The current price per tractor (3.5 - 5 m<sup>3</sup>) is around 120 NIS, which translates to an average of 30 NIS per cubic meter. This water tends to be of very good quality, as asserted by both residents, but this expense represents almost 10% of their income.

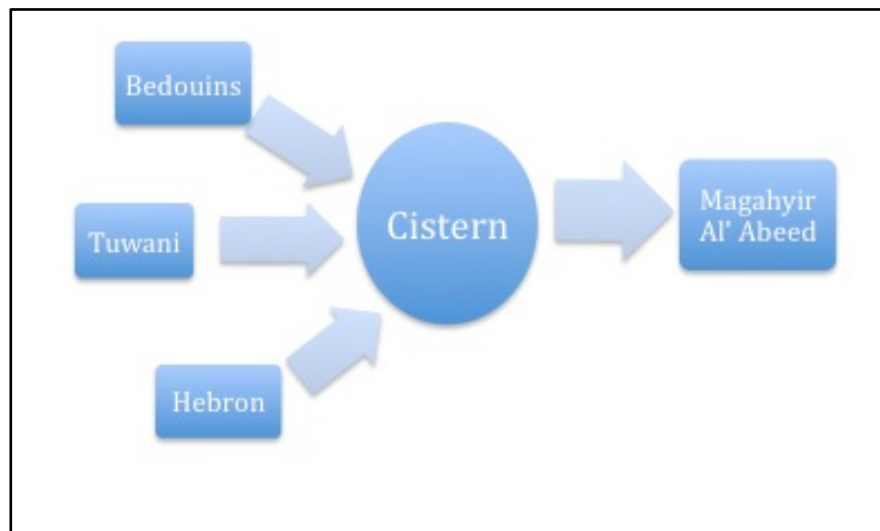
When asked about the major problems being faced by their communities, the lack of a medical center and water reliance on the near by settlement topped the list. According to one of the residents, the settlement refuses to sell water to the village especially during the summer time, which creates great pressure onto them since it is their only viable source of water.

### **1.5 Maghayir Al'Abeed**

This community is located within the governorate of Hebron in a region referred to as the southern Hebron Hills. Specifically, it is located in a closed military area denominated "Firing Area 918", surrounded by several settlements the closest of which is Ma'on (refer to fig. 16).

This community has a relatively small population ranging between 30 and 50 people, all of which are presumed to be extended family. Their main economic activity is animal husbandry -mainly goats-, although some of the males in the village tend to have informal jobs in the near by towns. It is relevant to note that by following a traditional lifestyle, all of the residents in the village still live in caverns, which in addition to the political situation makes access a very difficult endeavor.

The community is unconnected to a water network, and their only sources are rainwater and purchased tanker water. Figure 18 depicts the complexity of water distribution to this village. First, tanker water is provided from three different sources: the Bedouins, the village of Tuwani, or the city of Hebron. This tanker fills a cistern, which in itself provides water to almost 20 surrounding villages. These villages get the water from the cistern either by donkey or by renting a truck or tractor.



**Figure 18.** Tanker water distribution to Maghayir Al' Abeed village  
Source: H. Tito

This long water transport elevates its price considerably and current costs are set at around 200 NIS for a tractor (cap. 3.5 m<sup>3</sup>) and 700 NIS for a truck (cap. 15 m<sup>3</sup>). This translates into 60 NIS per m<sup>3</sup> and 50 NIS per m<sup>3</sup>, respectively. Due to the unique location of the village -which has no proper road access- renting a truck is the fastest way to get water to their household, but its high upfront expense is a big deterrent for most of the residents.

On the other hand, as depicted in figure 19, rainwater is collected by means of underground cisterns located on the sides of steep hills that are then connected directly to a household by regular hose.



**Figure 19.** Underground cistern in southern Hebron hills  
Source: H. Tito

In terms of water quality, it is interesting to note that both interviewees stated that rainwater seemed to be of higher quality for drinking purposes than purchased water. Also, an additional well exists in the vicinity but access is restricted due to settler violence.

One of the respondents stated that almost half of its income is spent on water while both stressed the fact that the major water consumption is caused by their livestock, which can consume as much as 1000 liters per day for 100 sheep.

When asked about the major problems faced by their communities, settler violence overtook the rest of the conversation. According to both interviewees, it is common for settlers to damage the road that connects the cistern to the three above-mentioned sources. It is also difficult to find drivers willing to deliver water to the cistern because road attacks seem to be commonplace, and the army does not stop them from happening. Furthermore, any kind of attempted infrastructure such as laying a water pipe or even repairing the cistern, are not allowed and are usually impeded by the army.

Finally, it is important to mention that when asked about any coping mechanism for water saving, one of them replied: *“conservation is not possible... I mean, we hardly have water to drink”*, while the other one stated: *“there is not really much we can do about it”*.

## **2. ANALYSIS BASED ON COMMUNITY SELECTION METHODOLOGY**

The previous chapter went into details regarding the selection procedure for each one of the communities to be visited. As stated, in addition to the shared open-ended interviewing process, the researcher selected the communities in pairs to allow him for a comparison in regards to a specific variable. This section will attempt to elucidate these differences based on the data gathered in the fieldwork.

In the case of Jurish and Iraq Burin, these communities were found to share very low positions in the water vulnerability ranking, low domestic water consumption, high percentages of income spent on water, and even a lack of connection to a water network. Nevertheless, while most of these factors were corroborated with the subsequent visit to the communities, their difference in water risk scarcity was put into scrutiny.

By being considered a community at high risk, Jurish did not seem to be any different than its counterpart -Iraq Burin- which scored lower in this respect. Still, as we further analyze the data, we realize that an important factor may help to explain such difference. For one, Iraq Burin has an additional water source in the form of a natural spring and although still dependent on tanker water bought from a near by settlement, their reliance on this source is lower than that of Jurish.

Additionally, Jurish residents stated that one of their main problems was settlement refusal to sell water especially during summer time. While the local authority from Iraq Burin mentioned something along these lines, it did not seem to be as much of a problem as for the residents of Jurish. These, the researcher

concluded, may be the main reasons why the latter can be considered to be at a higher “water risk” than the former.

In the case of Maghayir Al’ Abeed and Az Zubeidat, the researcher intended to make a comparison between two communities located in Area C in order to analyze the extent at which the Israeli occupation had a direct impact in their current water situation. Additionally, by being connected to a water network, Az-Zubeidat was stated to have a lower water consumption than Maghayir Al’ Abeed -which has no water connection whatsoever- and this fact seemed a good point for further analysis.

Based on the interviews, it is clear that both communities face great challenges due to the restrictions placed on them by being located in Area C. In the case of Maghayir Al’ Abeed, settler violence and the army indifference towards this situation creates great pressure in the community’s water livelihood. Additionally, by restricting any kind of water connection, denying permits to repair the cistern, and blocking access to the additional well in the area, the situation for the inhabitants of this village is simply alarming.

Correspondingly, Az Zubeidat challenges come in the form of building restrictions and economic limitations. Although not directly affecting the water situation in the village, the constraints due to the occupation have deeper economic and health related consequences.

In relation to their relative difference in domestic water consumption, the researcher’s own fieldwork made clear the more critical situation being faced by Maghayir Al’ Abeed. The higher water consumption attributed to this community can be inferred to include water used for livestock. As mentioned above, animal husbandry is the main economic activity of the village and about 1000 liters of water a day can be utilized for this activity. If this water is deducted from the literature’s calculation, the researcher concludes, a more accurate depiction of the actual water consumption per capita could be given.

Finally, in the attempted comparative case between Bardala and Ein El Beida, the notion was to analyze any major difference in service provided either by Mekorot or the Palestinian Water Authority, which according to the literature supplied water to each one of these communities. Unfortunately, this comparison was not possible because it was found during the fieldwork that Mekorot was the only provider to both villages.

### 3. FINAL DATA ANALYSIS

The following table summarizes the most relevant data gathered during fieldwork interviews and it will serve as a basis for further discussion.

**Table 7.** Community data collection summary

	<b>Az Zubeidat</b>	<b>Bardala</b>	<b>Ein El Beida</b>	<b>Iraq Burin</b>	<b>Jurish</b>	<b>Maghayir Al' Abeed</b>
<b>Administrative division</b>	Area C	Area B	Area B	Area B	Area B	Area C
<b>Water connection</b>	Yes (Mekorot)	Yes (Mekorot)	Yes (Mekorot)	None	None	None
<b>Water pricing (NIS / m<sup>3</sup>)</b>	3	0.5	0.5	20	30	50-60
<b>Water sources</b>	- Water network - Local well (only for plants)	- Water network	- Water network - Natural spring (only for animals)	- Rainwater - Tanker water - Natural spring	- Rainwater - Tanker water	- Rainwater - Tanker water
<b>Main perceived problems</b>	1) Water borne diseases due to: - Lack of sewage - Crowded housing - Limited water	1) Water restrictions 2) Material restrictions 3) Water pricing		1) Near by settlement	1) Lack of health center 2) Water reliance on near by settlement	1) Settler violence
<b>Additional constraints</b>	Export banning, checkpoints, prohibition of solid fertilizer	Export banning, prohibition of solid fertilizer, and almost half of the land not cultivated due to water limitations		x	x	Cistern repair, network connection, and well access are all restricted

Source: H. Tito

The table above provides us with strong insights regarding the existing interrelationship between water scarcity, conflict, and data representation in some of the most water vulnerable communities in the West Bank. Although discrete conclusions cannot be made without taking in consideration other surrounding factors, this section will attempt to develop the most crucial ones in further depth.

As stated in the previous chapter, one of the aims of this research project was to analyze how the selected communities perceive their current water situation and what are their main mechanisms to cope with this one.

In this respect, the most striking conclusion reached by the researcher is the fact every single one of the interviewees makes a direct connection between water scarcity and the Israeli occupation. Specifically, either by means of water reliance, settler violence, development constrictions, water quotas, pricing, or even military indifference, all of these factors seem to have a strong influence in the access, distribution, and use of water resources as perceived by the Palestinians.

The most affected communities by this situation are Maghayir Al' Abeed and Az Zubeidat, both of which are located in Area C. In the case of the former, water constraints are caused by settler violence, military indifference, and limitations for water connections and cistern improvement. For the latter, the lack of permits for further housing construction and the implementation of a sewage treatment plant, have had a direct negative impact in the health of the population and it is perceived as the main problem being faced by the community.

Furthermore, in communities dependent on Israeli settlements for water distribution -Jurish and Iraq Burin-, periodic reluctance tied to the dry season or the oPt's political climate makes them a vulnerable target for water control.

As for coping mechanisms, the residents of Iraq Burin mentioned specific lifestyles changes in order to deal with water scarcity, while authorities from the villages located in the Jordan Valley (Az Zubeidat, Bardala, and Ein El Beida) touched upon the change to a new drip irrigation system in order to save water used for agriculture. In the case of Magahir Al' Abeed, the statement made by one of the residents makes their situation clear: *"conservation is not possible... I mean, we hardly have water to drink"*.

Also, although the inefficiency from the Palestinian leadership was never directly mentioned, professionals in the water sector were never shy to allude that the PWA was only good for two things: *"read the meter and charge the bills"*.

Moreover, although a difference in water price between the connected and unconnected communities was expected, these differences are simply remarkable. The average piped water purchased from Mekorot currently stands at around 3 NIS per cubic meter (World Bank 18). Although the communities of Bardala and Ein El Beida obtain this water at a much lower price due to previous agreements, the rest of the unconnected communities tend to pay several times this price.

Specifically, the communities of Iraq Burin, Jurish, and Maghayir Al' Abeed, pay respectively seven, ten, and twenty times this average. Although the reasons for the lack of connectivity in the cases of Iraq Burin and Jurish were not verified, military restriction was found to be the main cause in the case of Maghayir Al' Abeed.

In addition to the found relationship between the Israeli occupation and perceived water scarcity, the author of this thesis concluded that strong economic limitations are prevalent within the Palestinian communities located along the Jordan Valley.



This area is considered the breadbasket region of the West Bank and is one of the main economic motors of Palestinian society, which also provides for internal food security. Still, strong limitations based on water allocation, material input, and export banning creates great pressure in the livelihoods of these communities. The most affected locality in this respect seems to be the village of Az Zubeidat due to additional Area C limitations.

Technically, nearly the entire region is closed up to the Palestinians and is controlled by Israel based on security grounds (refer to fig. 12). Even so, it is relevant to mention that over 30 Israeli settlements currently exist in the valley, and the big majority is involved in agriculture or other type of commerce with a production worth around \$130 million per year (Amnesty International 48).

According to the interviewees in these villages, the reason why Palestinians are not permitted the use of solid fertilizer is because Israelis fear they could make explosives out of this material. Therefore, the less efficient and more environmental damaging liquid fertilizer has to be used. On the other hand, no rationale was found behind the prohibition to export their produce to the surrounding countries.

There are several other details that could be analyzed in depth based on the interviews that were carried out by the researcher, but they fall out from the scope of this thesis. However, the complexity of the situation would actually require us to examine these economic, political, and religious factors if we were to truly understand how the issue of water permeates throughout the overall conflict.

## VI. CONCLUSIONS

The main objective of this work has been to analyze in detail the arguments related to the Israeli-Palestinian water conflict from a theoretical and practical approach. Additionally, the dispute over these resources has offered us a window into the complexity of the overall conflict, which early this year marked its 63<sup>rd</sup> anniversary without offering a tangible prospect for a peaceful resolution in the near future.

Nevertheless, the author believes that in addition to a challenge, the problematic over water resources offers and opportunity for cooperation which can serve as a model for the management of other issues in dispute. Still, this would require strong political willingness, concessions from both sides, and international support and guidance at every step of the process, as it was in the case of the Oslo accords.

In regards of the outcome of this paper, some conclusions can be unambiguously reached from this initial analysis: First, it is found that rather than the cause, the Israeli occupation serves as the means by which a disparate exploitation of water resources currently occurs in the West Bank. The restrictions placed on the Palestinians, either of land, of movement, or of management; creates a strong power differential by which Israel can act and decide with impunity over these resources, while Palestinian development in this area is simply impossible under current conditions.

Second, even if a clear connection between the Israeli occupation and water scarcity cannot be made at all times, the Palestinian interviewees seem to always perceive the latter as the reason for their difficult situation. Although true at some extent, it is also crucial to understand that the current political ineffectiveness of the PWA exacerbates the current water crisis, and steps should be taken for an institutional reform in the sector.

Third, while tremendous disparities occur in terms of water costs, use, and access among different Palestinian communities, these are not depicted appropriately in the given data and therefore a better representation tool should be considered for this purpose. An instrument of the kind would allow for more efficient channeling of resources into high-priority projects, which will serve the most affected communities and notably the rural poor. Again, Israel's willingness to share information and openness for greater accountability would be necessary.

Finally, although leaving much room for interpretation, international law should also be used to analyze the current situation. Specifically, human rights law, humanitarian law, and international law on the management of transboundary waters are applicable in this case. The two first cases would ensure Israel's responsibilities as the occupying power to provide the basics of survival to the civilian population. Water rights as established by the UN Human Rights Council as well as the Geneva Convention, enshrine these responsibilities. For the latter, principles of equitable use and prevention of significant harm should be reconsidered with facts on the ground, in which obvious disparities occur.

## ANNEX 1

### Template questionnaires for residents and local authorities

#### Questionnaire for local authorities

Name of the community:

Position of interviewee:

Administrative division:

Population:

Date:

- Is your community connected to a water supply? If yes, who is the provider (WBWD, PWA)? If no, how/where do you get the water from?
- What is the reason for not being connected to a water network?
- How regular is the service? (for communities connected to a water network)  
If well/spring is used: what is the distance to the source?  
If water tanker is used: How often do you get water? What is the average price per cubic meter?
- Are you aware of the water quality in your community?
- How is the water residue disposed? Where? Any costs?
- How expensive is water in general?
- Are there any local medical centers in the community? Is the service regular or irregular? If medical center available, visit to find rate of water born diseases.
- What is the main economic activity of community?
- What would you consider to be the major problems facing your community?
- Is there anything specific you would like me to share with people abroad?

## *Questionnaire for residents*

Name of the community:

Name of interviewee:

Administrative division of household:

Household size:

Date:

- Tell us about your water supply... any specific problems such as regularity/pressure/quality?
- Is your house connected to a water network? Where do you get the water from?
- If water situation is scarce: How do you manage with the situation? For example: Buying water (from unsafe sources), reusing water for several tasks, flushing toilets less frequently, washing less regularly, washing clothes as little as possible, shower times and regularity, if agriculture is practiced: any specific type of crop, fewer animals, unlicensed wells, etc.
- How expensive is the water for you? Average expenditure on water from total income.
- What other problems does your household face/need attention? For example: Economic, access (transportation, road closure), political (soldiers coming into the house/village, settlers).
- Have any member of your family ever-got ill from water problems?
- Is there anything specific you would like me to share with people abroad?

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