

Water resource allocations in the occupied Palestinian territory: Responding to Israeli claims

Position paper from the Applied Research Institute Jerusalem (ARIJ)



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Abstract

This paper attempts to address the injustice of water resource allocation, access and consumption in the occupied Palestinian territory (oPt). Water is controlled by Israeli authorities who allocate the resource through a series of military orders and practices that discriminate against Palestinians. This situation fragments Palestinian water rights through construction of the Separation Wall and Israeli settlements along with demolitions of water infrastructure in the West Bank. The water crisis in the Gaza Strip is also addressed to expose the dire consequences of the ongoing conflict and blockade imposed by Israel. Failures of the Interim Agreement (1995) and the associated Joint Water Committee are also uncovered which reveal how Israel is actively blocking developments for Palestinian water supply and wastewater treatment projects. This paper further responds to a report published by Haim Gvirtzman (2012) entitled, "The Israeli-Palestinian Water Conflict: an Israeli Perspective", which claims that Israel has fulfilled all obligations under the Interim Agreement and accuses Palestinians of negligence, ineffective governance, and failure to adopt principles of sustainable management. However upon analysis of Gvirtzman's (2012) paper it is realised that he does not acknowledge the interim nature of the agreement or register the asymmetrical power imbalances that exist within the Joint Water Committee. He further denies Israel's responsibility to uphold norms of international law and principles of human rights. Gvirtzman's paper ultimately fails to appreciate the reality of the water situation within the oPt and the hardship imposed on Palestinians by the Israeli occupation. This paper proposes recommendations to the Government of Israel to recognize Palestinian water rights and eradicate illegal policies and practices that deny Palestinians equitable access to water resources.

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1. Introduction

Since 1967 Israel has occupied the Palestinian territory and has maintained a tight grip of control on available water resources. This control has been executed through military orders and discriminatory water policies that have denied Palestinians the right to water in the occupied Palestinian territory (oPt). Construction of the Separation Wall, expansion of Israeli settlements, and destruction of Palestinian water infrastructure are all facilitating Israeli hydro-hegemony¹ in the region. This situation is further aggravated by over-abstraction and water diversions by Israel which has triggered water shortages to the extent that an acute water crisis has developed in the oPt.

Following the 1995 Oslo Accords, Israel was allocated 80 percent of the West Bank aquifer's "estimated potential", and the Palestinians were allocated only 20 percent (*Attili, 2012; Glavany, 2011*). This severe disparity in water resource allocation manifests into direct and indirect economic losses for Palestinians. Direct losses amount to the higher costs for water, and indirect losses relate to lost agricultural production along with health problems related to poor water quality (*ARIJ, 2012*). These losses are crippling economic growth and development in Palestine. Israel should be held accountable for these losses as they have neglected the 1995 Israeli-Palestinian Interim agreement, side-stepped international law, and violated basic human rights, as further explained in this paper.

A series of critical publications from the Palestinian Authority (PA), Israeli human rights groups, governments, and other international civil society organizations, have highlighted this injustice. In December 2011, a French Parliamentary report stated that the Israeli allocation of water is "a weapon serving the new apartheid" and compared Israeli segregation policies with those adopted in apartheid South Africa (*Glavany, 2011*). The Israeli Ministry of Foreign Affairs (MFA) and the Civil Administration condemned the report (*JPost, 2012*). The Begin-Sadat Center for Strategic Studies at Bar-Ilan University responded in defense of Israel with a report entitled, "The Israeli-Palestinian Water Conflict: an Israeli Perspective", by Haim Gvirtzman (2012). In this paper, Gvirtzman argues that there is no difference in per capita water consumption between Israelis and Palestinians and refutes criticism against Israel for not adhering to obligations according to signed water agreements. Instead he places responsibility for Palestinian water shortages squarely on the shoulders of the PA's ineffective governance and failure to adopt principles of sustainable management.

In addition the Israeli MFA issued a formal statement that denies negligence (*MFA, 2012a*), and a report that claims Israel has in-fact supported Palestinian water supply projects (*MFA, 2012b*). Israeli media has also contributed to the debate such as Meotti (2012) who argues that Israel's survival is at risk if it loses control of water resources, along with Marquardt-Bigman (2012) who renders all publications that criticize Israel's water policies as "water libel". These statements, opinions, and reports form the general contention of the Israeli Government regarding the water situation in the oPt. This rhetoric can no longer be ignored as it seriously undermines Palestinian water rights in the oPt and damages the potential for a permanent solution between Israel and Palestine.

Both the MFA Israel (2012a) and Gvirtzman (2012) claim that the issue of water scarcity in the region could be changed from a source of controversy and tension to one of understanding and cooperation if both sides are prepared to start planning future water supply plants together. This statement is reinforced by ARIJ but as this paper will reveal it is difficult to achieve as the engineered policies of one side (Israel) discriminate against the other (Palestine). This paper has been developed partly in response to Gvirtzman's (2012) "Israeli perspective", and partly to reveal the actual situation regarding the impact of the Israeli occupation on Palestinian water resource allocation. This contention has been developed by ARIJ and is endorsed by the Emergency Water Sanitation and Hygiene group (EWASH)².

¹ Hydro-hegemony is hegemony at the river basin level, achieved through water resource control strategies such as resource capture, integration and containment. The strategies are executed through an array of tactics that are enabled by the exploitation of existing power asymmetries within a weak international institutional context (*Zeitoun & Warner, 2006*).

² Founded in 2002, the Emergency Water and Sanitation/Hygiene group (EWASH) is a coalition of aid agencies working together to coordinate interventions, respond to needs, share information and do advocacy on the water and sanitation sector in the occupied Palestinian territory (oPt). Members include local and international NGOs and UN agencies.

2. Water resources in the occupied Palestinian territory

Israel and the oPt share three major trans-boundary water sources; the West Bank Aquifer system, the Jordan River, and the Coastal Aquifer (see figure 1). This chapter will briefly describe the hydrological characteristics of these resources and their geographical division between Israel and the oPt.

Figure 1: Shared groundwater aquifers in Israel and the oPt. Source: ARIJ, 2009



2.1. The West Bank aquifer system

The West Bank aquifer system extends over 130 Kilometers (Km), from Mount Carmel in the north to Beersheva in the South, at a width of 35 Km. It is fed mostly by rainfall that falls over the mountains in the West Bank. The West Bank aquifer system is divided into three groundwater basins underlying the territory: the Eastern Aquifer, the Western Aquifer, and the North-western aquifer. These aquifers provide jointly an estimated 679 million cubic meters (MCM) of water per year (*World Bank, 2009*). Gvirtzman (2012:26) states that Israel utilised the majority of the West Bank aquifer prior to 1967 and therefore justifies Israel's exploitation of this resource by claiming "historical ownership" which is not linked to the occupation. He states that before 1967 Israel utilised 490 MCM of water from the West Bank aquifer system and the Palestinians utilised only 105 MCM. In reality historical ownership belongs to the Palestinians who shared the resource with the Jewish communities before the birth of the Israeli state. Gvirtzman (2012) also argues that the West Bank aquifer is vital for supplying water to the urban centers of Tel Aviv and Jerusalem along with most towns on the coastal plain. He fails to mention the extent to which the National Water Carrier project, desalination technology, and the Jordan River supplement Israeli water supply.

The eastern aquifer lies entirely within the West Bank territory and has a safe yield of 175 MCM per year. After 1967, Israel expanded its control over this aquifer and began to tap into it, mainly to supply expanding Israeli settlements in the area. In recent years the productivity of Palestinian wells supplied by Eastern Aquifer has dropped considerably, a result of continued Israeli abstraction and exploitation (*Issac, 2006*). The North-eastern aquifer is 80 percent within the West Bank and the remainder is shared with Israel. The Northeastern aquifer is the smallest with an annual safe yield of 145 MCM. Palestinians consume around 18 percent of the safe yield from the Jenin district and East Nablus (Wadi Al Far'a, Wadi El Bathan, as well as Aqrabaniya and Nassariya) for both irrigation and domestic purposes. The western aquifer system is the largest and covers an area of 1,600 km² with a yield of 362 MCM per year (*ARIJ, 2011*). Eighty percent of the recharge area of this basin is located within the West Bank, and 80 percent of the storage area is located within Israeli borders. There are 250 operational wells within the West Bank aquifer system in addition to local springs (*PWA, 2012*).

2.2. The Jordan River

The Jordan River is an important shared surface water resource for the riparian states of Lebanon, Syria, Palestine, Israel, and Jordan. The Jordan River originates from three main springs; Baniyas in the occupied Golan Heights, Dan in Israel and Hasbani in Lebanon. The waters flow southward through Lake Hula towards Lake Tiberias after which it is joined by the Yarmouk and Zerka tributaries as it continues to flow southward until it trickles into the Dead Sea at approximately 400 metres below sea level. The entire length of the Jordan River is 360 Km with a surface catchment area of about 18,300 Km². Palestinians are denied access and supply of water from the Jordan River while Israel enjoys utilizing it to satisfy one third of its water demands. Israel diverts water from the Jordan River and the Sea of Galilee through the National Water Carrier. The carrier pumps 450 MCM per year from the Galilee region to the Negev and on route links Israel's regional water projects.

Prior to the 1950s, the annual flow of the Jordan River was 1,300 MCM per year. Today it remains less than 50 MCM per year of highly saline water and wastewater. As a result the Dead Sea has experienced a rapid decline in water level and water quality which has scarred the landscape, polluted the environment and destroyed ecosystems that are reliant on it. Israel has violated the water rights of the riparian countries that share the Jordan River, particularly Palestinian water rights that were identified in the Johnston Plan (1953-1955). The Johnston Plan included water distribution quotas for the Jordan River basin riparian states, estimated at 1,287 MCM annually. The plan also called for construction of a West Ghor Canal to provide the Palestinians with an estimated 250 MCM of water per year. The plan has never been ratified and the waters of the Jordan River have been exploited ever since by unilateral projects without any compliance to equitable water allocations.

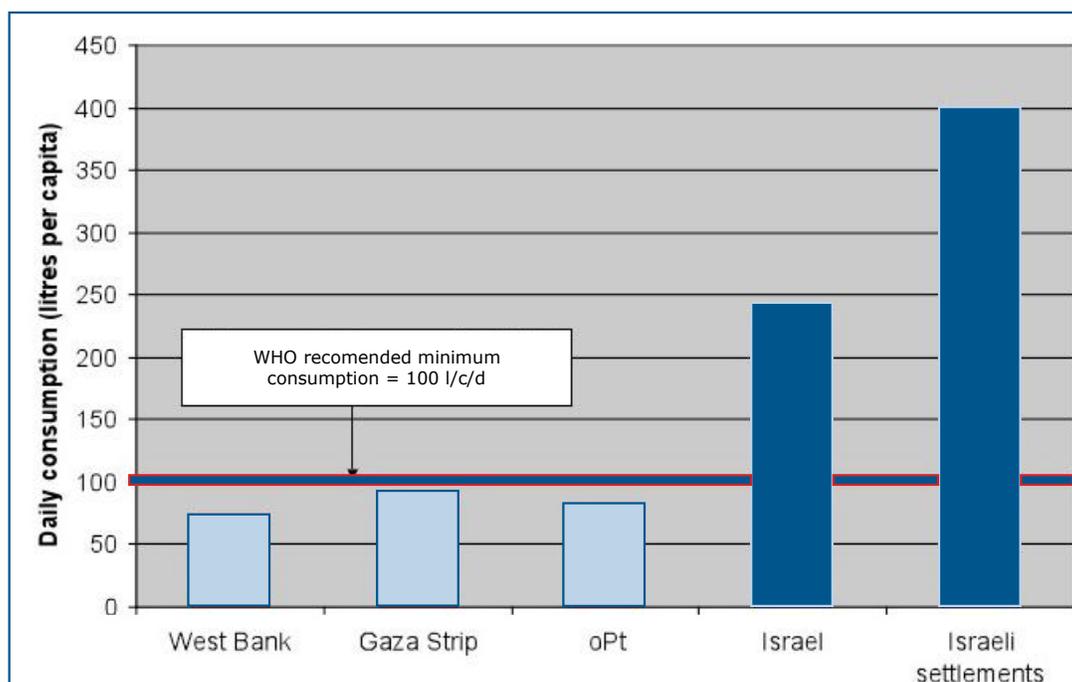
2.3. The Gaza Coastal Aquifer

The coastal aquifer is located under the coastal plain of Israel and the Gaza Strip. The system extends 120 Km along the Mediterranean coastline from Gaza in the south, to Mount Carmel in the north. Its width varies from 3-10 Km in the north, to 20 km in the south. The coastal aquifers yearly sustainable yield is estimated at 450 MCM per year in Israel and 55 MCM per year in Gaza. Local resources from Gaza are obtained from 4,779 groundwater wells with depths mostly ranging between 25 and 30 metres (*PWA, 2012*). In recent years, due to a rapidly growing population in the Gaza strip, the aquifer has been over-pumped beyond its sustainable yield at a rate of 50-60 MCM per year (*PWA, 2012*). As a result the water table has fallen below sea level and saline water has intruded rendering 90-95 per cent of the water non-potable. The aquifer is also heavily polluted due to untreated and unregulated sewage infiltration and fertilizer run-off from agricultural lands.

3. Water consumption in Israel and the occupied West Bank

The disparity in water consumption between Israel and Palestine is more evident today than ever before. In the West Bank the average daily per capita water consumption rate (domestic, urban and industrial use) is around 73 litres (*PWA, 2012; B'Tselem, 2011a*). This figure is much lower in certain areas of the West Bank such as Tubas governorate where the average consumption rate for the 48,000 Palestinians who reside there is 30 litres per person per day. However residents of the illegal Israeli settlement of Beda'ot, just 12km south of Tubas, consume around 401 litres a day (*B'Tselem, 2011a*). The World Health Organization (WHO) recommends 100 litres of water per capita per day as a minimum. Daily Palestinian consumption is one-third less than the recommended quantity. By comparison, daily per capita water consumption in Israel is 242 litres (*B'Tselem, 2011a*). Amnesty International (2009) and the Palestinian Water Authority (2012) claims this gap is even wider at 70 litres per capita daily for Palestinians, and 300 litres per capita daily for Israelis. Figure 2 illustrates this disparity and also includes the figure for daily water consumption in the Gaza Strip which is slightly higher than the West Bank at 91 litres per capita (*B'Tselem, 2010*).

Figure 2: Disparity between water consumption in the oPt, Israel and Israeli settlements.
Source: *B'Tselem 2011a; B'Tselem 2010*

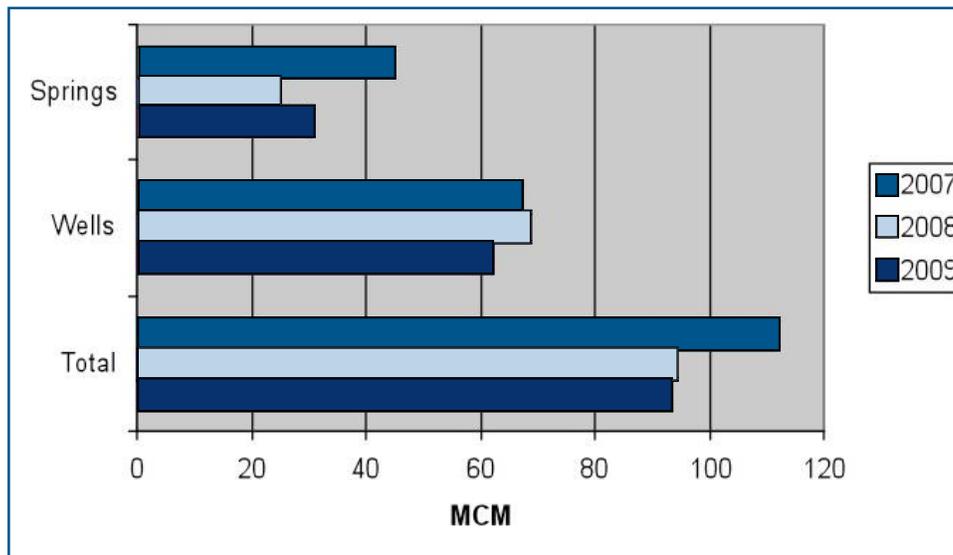


Gvartzman (2012) argues against these figures claiming that the difference between Israeli and Palestinian water consumption is “negligible” with the current per capita consumption at 150 cubic meters per capita per year ($m^3/c/y$) for Israelis (410 litres per person per day), versus 140 $m^3/c/y$ for Palestinians (380 litres per person per day). He rejects the Palestinian’s claim of a larger gap in per capita consumption stating that a discrepancy exists between PA and Israeli data regarding the Palestinian population. The Palestinian Central Bureau of Statistics (PCBS) reported in 2004 that 2.4 million Palestinians reside in the West Bank, while the American-Israeli Demographic Research Group (AIDRG) calculated only 1.4 million accounting for a “million person gap” (*Zimmerman et al, 2006*). The figure of 2.4 million, as estimated by the PCBS, is the accepted figure adopted by the PA and the international community. The concept of a “million-person” gap has enabled Gvartzman (2012) to calculate a much smaller disparity in per capita water consumption between Israelis and Palestinians.

In reality a large disparity in consumption exists due to Israeli discriminatory policies that allow Israel to enjoy a consumption rate of 2,200 MCM per year for a population of 7 million. Most of

Israel's fresh water supplies are drawn from the shared groundwater and common surface water resources – more than 400 MCM per year from the West Bank Aquifer system, and up to 450 MCM per year from the diverted Jordan River (*Amnesty International, 2009*). These figures do not take into account water supplied to Israel through desalination technology. Israel boasts the largest seawater reverse osmosis desalination plant in the world and claims it will be a “regional water exporter” by 2014 (*YNet News, 2011*). In comparison, in 2009 overall Palestinian water extraction from the West Bank Aquifer system was 93 MCM, down from 138.2 MCM in 1999 (*World Bank, 2009*). Figure 3 highlights that in recent years Palestinian abstraction from the West Bank Aquifer system has been declining.

Figure 3: Annual Palestinian abstraction from wells and springs. *Source: PWA 2008*



Water consumption in the agricultural sector also reflects a severe imbalance. In 2006 Israel's agricultural consumption of water amounted to 1,107.8 MCM (of which 519.3 MCM was fresh water). Israeli agricultural settlements in the West Bank, particularly those in the Jordan Valley, utilise high quantities of water. In comparison, agricultural water consumption in the oPt for 2006 was at 170.8 MCM (*COHRE, 2008*). Irrigated areas in the oPt cover approximately 201,358 dunums, compared to 2,177,500 dunums of irrigated areas in Israel (*Issac, 2006*). This imbalance is further realized when we compare the contribution of the agricultural sector in Palestine which is estimated at 20 percent of the GDP, in comparison to only 1.6 percent to the GDP in Israel (*Issac, 2006*). Lack of access to adequate quantities of water necessary for livestock herding and food production leaves Bedouins, livestock owners and farmers particularly vulnerable.

Gvartzman's (2012) contention continues by stating that the Palestinian water situation is “superior to that of other developed nations”. He states that the Palestinians are a “unique phenomenon” as they have experienced increased access to water which has shown an opposite trend to the global situation which indicates a decrease in per capita consumption over time due to population growth and deterioration of water resources. The Israeli MFA (2012a) argues that since 1967 the amount of fresh water used by Israel has decreased by 73% per capita and the amount used by Palestinians has increased by 10% per capita. In reality, despite recognition of an increase in the total amount of water available, the amount of water per capita is now less than in 1967 as the Palestinian population has more than doubled since then (*World Bank, 2009*). At an average of 73 litres per person per day, the amount of water available to Palestinians is the lowest in the region (*Amnesty International, 2009*). Furthermore only 77% of communities are connected to the water supply network in the West Bank (*PHG, 2008; World Bank, 2009*). Communities who lack access to a supply network depend on tankered water instead and pay up to 400 percent more for every litre than those connected to the water network, adding considerable financial strain to already vulnerable populations (*EWASH, 2012b*). The situation is particularly acute in the Jordan Valley where households often spend 40-50 percent of their income on water (*Ma'an Development Center, 2011*).

Israeli hydro-hegemony in the region has left Palestinians with a water budget suffering from extensive deficits. In order to substitute for this deficit Palestinians have been forced to purchase 36 percent of domestic water supplies (55.5 MCM per year) from Mekorot, Israel's National Water Company (PWA, 2012). The remaining 64 percent is abstracted from local wells and springs in the West Bank amounting to 98 MCM per year. These amounts are finally distributed to end users by local village councils, municipalities and other service providers. Table 1 highlights the annual quantities provided from both local resources and Mekorot in 2010. During the summer months Mekorot prioritises the demands of Israeli settlements and restricts supply to adjacent Palestinian communities. The forced dependency on Mekorot to supplement water supply financially strengthens the Israeli occupation and its control over water resources along with dissolving Palestinian water autonomy. It is clear that the Palestinian water situation is far from "superior" as stated by Gvirtzman.

Table 1: Total of local and purchased water in the West Bank (2010)

Governorate	Population	Local Resources (MCM)	Percent (%)	Purchased water (MCM)	Percent (%)	Total Resources (MCM)
Jenin	274001	7.996	80	1.990	20	9.986
Tubas	54765	9.698	69	4.3362	31	14.034
Tulkarem	165791	13.725	97	0.398	3	14.123
Nablus	340117	14.31	80	3.637	20	17.947
Qalqilya	97447	10.91	94	0.679	6	11.589
Salfit	63148	0.174	7	2.450	93	2.624
Ramallah	301296	3.585	18	16.391	82	19.976
Jericho	45433	25.029	93	1.831	7	26.86
Jerusalem	144740	0.693	15	3.942	85	4.635
Bethlehem	188880	4.504	37	7.553	63	12.057
Hebron	600364	7.702	39	12.230	61	19.932
Total	2275982	98.326	64	55.437	36	153.763

Source: PWA, 2012

4. Israeli-Palestinian Water Agreements

4.1. Israeli-Palestinian Interim Agreement on the West Bank and Gaza Strip

Water has played a major role in the Israeli-Palestinian peace process and formed the basis of negotiations during the Oslo Peace Accords. The Israeli-Palestinian Interim Agreement on the West Bank and Gaza Strip signed in 1995 formed the basis for Israeli-Palestinian cooperation in the water and sewage sector³. Israel agreed to recognize Palestinian water rights in the West Bank as stated in Article 40, Annex III of the Interim Agreement. However the agreement fails to define what these rights are instead leaving them to be negotiated in the permanent status talks along with other issues such as Jerusalem, the final borders, the refugees' right of return, the fate of Israeli settlements, and security. The interim agreement was only meant to last for a five year period during which time a permanent agreement would be negotiated leading to an independent Palestinian state. Failure to reach a final agreement has meant the inequitable distribution of the groundwater resources remains to the current day, with 20 percent of the West Bank Aquifer system allocated to Palestinians and 80 percent allocated to Israel. Table 2 reveals the terms of Article 40 regarding the agreed allocation of groundwater resources.

Table 2: Shared water resources - allocation as codified in the Oslo Accords

Groundwater resource	Total annual recharge rate (MCM)	Israel's annual allocation (MCM)	Palestine's annual allocation (MCM)
West Bank aquifer system	679	483	118 (+78 for future needs)
Western Aquifer	362	340 (94 percent)	22 (6 percent)
Northeastern Aquifer	145	103 (71 percent)	42 (29 percent)
Eastern Aquifer	172	40	54
Jordan River	The Oslo Accords contain no provisions that allow Palestinian access to the Jordan River water resources.		

Source: Article 40, 1995

Gvirtzman (2012) argues that Palestinians have violated the Interim Agreement by drilling unauthorized wells and establishing illegal connections to Mekorot water pipelines. The Israeli MFA (2012a) claims there are over 300 unauthorized Palestinian wells in the West Bank. Furthermore both Gvirtzman (2012) and the Israeli MFA (2012a) argue that the PA does not uphold basic principles of sustainability and fails to adopt responsible management practices (Gvirtzman 2012:28). Gvirtzman (2012) ultimately fails to appreciate that the Interim agreement failed to distribute water resources as stipulated in Article 40. There are two major flaws within the Interim Agreement which has allowed Israel to continue to exploit and control water resources in the West Bank.

Firstly, the agreement does not equitably allocate available water resources. Instead it estimates "future needs" of West Bank Palestinians at 70-80 MCM per year, of which Palestinians are allowed to pump from the "unutilised water of the Eastern Aquifer and other agreed sources", at a rate of 41-51 MCM per year. However, due to the lack of accurate and unbiased environmental assessments, the agreement vastly overestimated the remaining potential of the Eastern Aquifer (Selby, 2005). In reality the "unutilised water" of the Eastern Aquifer is partly inaccessible due to the hydro-geological characteristics of the system and the rapid decline of the water table in recent years (BTselem, 1998:8; Selby 2005). Selby (2005:15) states that the continued exploitation of the groundwater system is "a recipe for environmental destruction", with the intrusion of saline water into the aquifer. Another major flaw relates to the concept of "other agreed sources" which is not defined in the agreement and so does not exist for Palestinians.

³ This paper notes that Gvirtzman (2012) incorrectly refers to the agreement as the 'Judea and Samaria Interim Agreement'. Judea and Samaria are the biblical names used to describe the area of the West Bank.

Secondly, the agreement underestimates “future needs” over a five year period and does not reflect increased demand from the absence of a peace agreement. In reality this amount only expresses the immediate needs of the Palestinians to satisfy domestic demand during the interim agreement period without considering future population growth or development of other sectors such as agriculture, industry or tourism. The population of the West Bank has increased by approximately 50 percent since the Oslo II agreement was signed in 1995, and per capita availability of fresh water has significantly declined since then (*World Bank, 2009*). Based on calculations of municipal, industrial and agricultural demand, Jayyousi and Srouji (2009), estimate that the Palestinian water sector should develop a total of 860 MCM per year by 2020 in order to satisfy future needs.

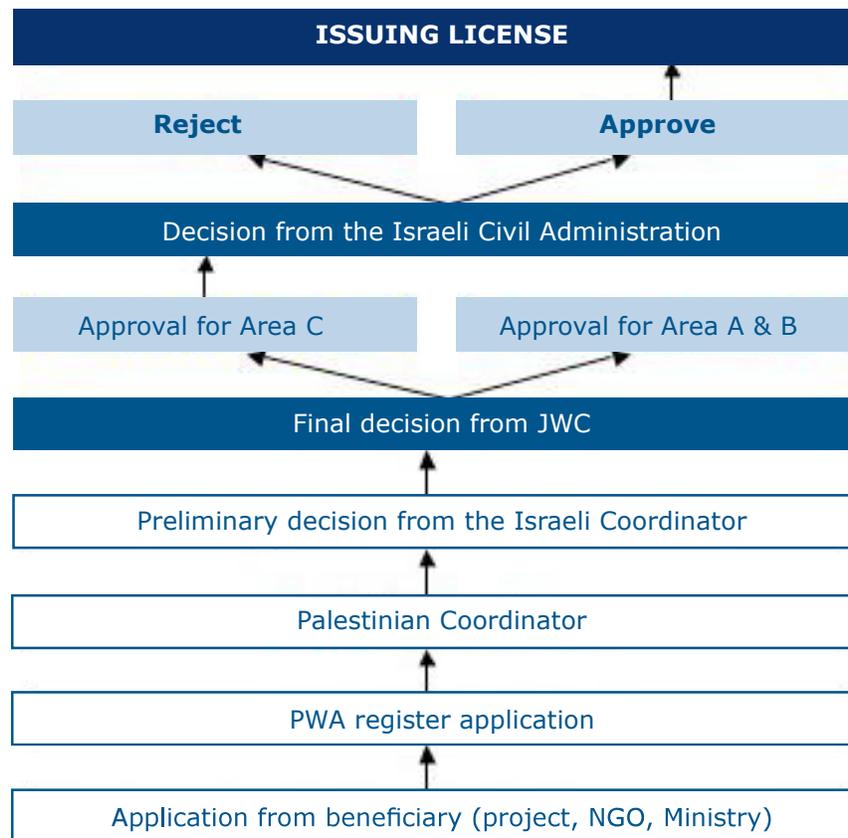
Despite these serious flaws Gvirtzman (2012) and the Israeli MFA (2012a; 2012b) claim that Israel has not only fulfilled, but exceeded all its obligations according to the water agreement. Both Gvirtzman and the MFA believe that Israel has made available approximately 70 MCM of water per year to the Palestinians, increasing supply by 50 percent; “development of water supply systems for the Palestinian communities has been carried out on an extensive scale beyond that called for in the Interim Agreement” (*Gvirtzman, 2012:8*). This section has made it clear that Gvirtzman’s claims are inaccurate as the water allocated to the Palestinians in the Interim Agreement is insufficient in relation to quality, quantity available, and “future needs”. Israel maintains its status of hydro-hegemony by implementing the Interim Agreement through the Joint Water Committee.

4.2. The Joint Water Committee

The Joint Water Committee (JWC), established under Article 40 of the Oslo II agreement, is mandated to deal with all water and sewage-related issues in the West Bank. This includes the coordinated management of water resources and water and sewage systems, including; granting permits for drilling wells; water resource systems development; protection of water resources and water and sewage systems; setting abstraction quotas; resolution of water and sewage disputes; and cooperation in the field of water and sewage, including exchanging information. The JWC is comprised of an equal number of Israeli and Palestinian representatives and “all decisions of the JWC shall be reached by consensus” (Article 40). It is a coordinating body, with the Palestinian Water Authority (PWA) responsible for the day-to-day operation of the Palestinian water sector.

Despite the egalitarian ideals of the JWC the system has merely formalised the discriminatory management regime of the occupation (*Selby, 2005*). Selby (2005) states that in reality the JWC does not function as a “joint” water resource management institution and discriminates against Palestinians. The primary reason for this relates to the structure of the JWC which favors Israeli control. Figure 4 highlights the JWC’s licensing procedure which reveals that the Civil Administration of the Israeli military plays a key role in the licensing procedure for all permits in Area C. Area C comprises of 61 percent of the West Bank and is under full Israeli civil and military control (figure 6, p.17). Furthermore, an estimated 9.3 percent of the West Bank has been confiscated by Israeli settlements (*Peace Now, 2009*), which do not fall under the jurisdiction of the JWC. Sometimes a permit is granted by the JWC, and then refused either wholly or partially by the Israeli Civil Administration (*Glavany, 2011*). As Selby (2005:12) notes, a joint management system in which one party has no option but to assent to the colonisation of their own land is little more than a ‘dressing up’ of cooperation as domination.

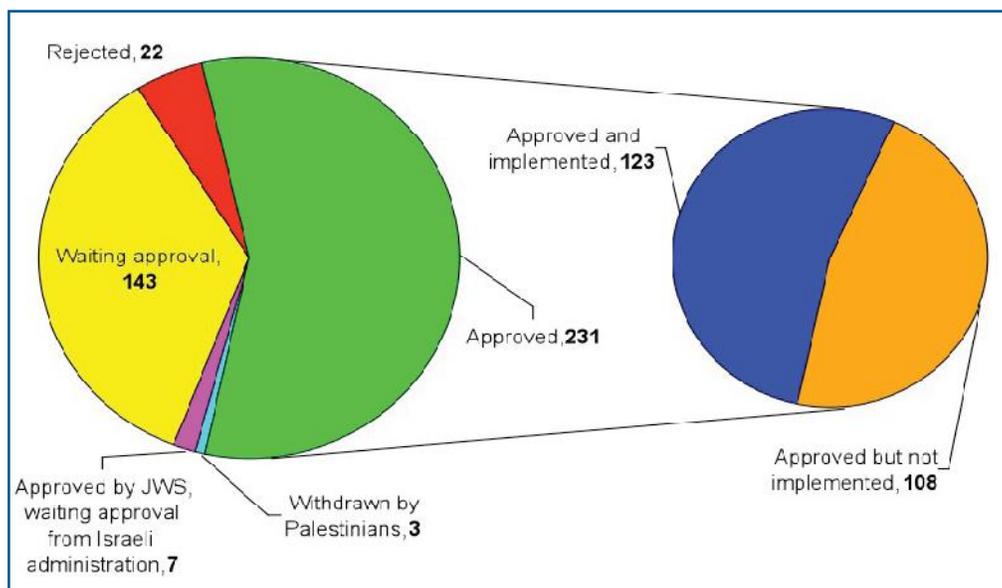
Figure 4: Licensing procedure and structure of the joint water committee showing Civil Administration approval required for Area C. Source: Zeitoun, 2007



Article 40 of Annex III of the Oslo II agreement provides for the transfer, by Israel to the Palestinians, all the powers and responsibilities relating to water and sanitation, but only those for Palestinians (Article 40) within areas A and B only. Areas A and B are not contiguous, but fragmented into enclaves surrounded by Israeli settlements and settler-only roads, as well as Area C. This configuration prevents the development of efficient infrastructure for water supply and sewage disposal (Glavany, 2011). Most Palestinians live in areas A and B, but the infrastructure on which they depend lies inside or crosses Area C. The movement of Palestinians in Area C is limited or prohibited and the Israeli army rarely allows construction or development works. Subsequently, only one-quarter of the land within the Palestinian political boundary of the West Bank is subject to equal Palestinian-Israeli joint management, with the rest subject to an approval mechanism that prioritises Israeli military objectives and settlement expansion over Palestinian developmental or environmental objectives (Zeitoun, 2007).

In addition, contrary to Gvirtzman’s (2012:5) contention, there is actually a minimum level of “cooperation” in the JWC which has become extremely dysfunctional in recent years. Following the five year interim period, and with the start of the second intifada, the JWC lost consistency through reduced and intermittent meeting times. Since 2002, the frequency of JWC meetings has dropped to 1-3 times per year (World Bank, 2009; Tal-Spiro, 2011). Figure 5 highlights that out of the 417 Palestinian projects submitted to the JWC during 1996-2008, only 231 projects were approved, whilst 22 projects were rejected and 143 projects are still waiting JWC approval. In 2011 the PWA submitted a total of 38 projects to the JWC of which 3 were approved as part of a list of agricultural wells in need of rehabilitation (EWASH, 2012b). Since 1967, not one permit has been granted to Palestinians to drill a new well in the Western Aquifer, the most productive aquifer basin. In addition, 120 Palestinian agricultural wells cannot be operated as they lack JWC approval for repair and maintenance (EWASH, 2009).

Figure 5: Outcome of Palestinian projects submitted to the JWC from 1996-2008.
 Source: World Bank 2009, Glavany, 2011



Gvirtzman (2012:21) also argues that the Palestinians have not succeeded in independently increasing their water supply despite the availability of international aid for the planning and financing of water projects. However in reality most donors are discouraged from investing in the water sector within the oPt due to the bureaucratic constraints of the JWC system. Aid agencies are required to go through the same process for a permit even if the intervention is humanitarian in nature. Some agencies only implement water and sanitation projects after permits are obtained, meaning that Area C is neglected from intervention because permits are almost never granted. Agencies that proceed without a permit run the risk of project demolition and jeopardize their reputation within Israel and the community who benefits from the project (EWASH, 2012b).

The JWC also grants Israel control over the wastewater sector. As Gvirtzman (2012:21-22) notes, there has been no significant progress in wastewater treatment apart from the wastewater treatment plant in Al-Bireh, near Ramallah. He states that the lack of effective wastewater treatment is contributing to environmental pollution and contamination of water resources in both the oPt and Israel. Gvirtzman (2012:22) contests that the Palestinians, through acts of negligence, are allowing sewage to flow into the Israeli territory. He also argues that Palestinians are violating the interim agreement by "refusing to build sewage treatment plants despite available funding". These accusations clearly do not consider the asymmetrical relationship of the JWC and the fact that Palestinian wastewater projects are often denied or ignored by Israel. Gvirtzman (2012:30) rightly states that increasing Palestinian water supply can be achieved by improving wastewater development, but it is clear from this analysis that Israel is obstructing investment and development in this sector.

Furthermore, Israel, through the JWC, uses its veto power as a "political bargaining chip" (COHRE, 2008:22). For instance, in 1998, the PWA received funding from the German Development Bank (US\$ 300,000) to build a wastewater treatment plant in the Salfit Governorate. The JWC approved the project conditional upon connecting the largest West Bank settlement of Ariel to the treatment plant (COHRE, 2008; EWASH, 2012b). A similar situation occurred in the Qidron Valley, in the Bethlehem Governorate. However connecting the illegal settlements to wastewater infrastructure is a demand that the Palestinians are unable to comply with since it legitimizes the existence of the settlers which works against permanent status and peace negotiations. Israel has not only failed to support Palestinian attempts to advance solutions for wastewater treatment, it has delayed them. As a result only 52 percent of Palestinian homes in the West Bank and Gaza, primarily in towns and cities, are linked to sewerage systems (ARIJ, 2011:417). The remaining 48 percent of Palestinians who lack wastewater facilities deposit their wastewater into cesspits which eventually percolates into groundwater reserves polluting water resources.

5. International law and Palestinian water rights

The right to access water is a fundamental human right that has been addressed in several international and regional treaties and conventions. The first time water access was explicitly mentioned as a human right was in 1977 at the United Nations (UN) Water Conference (Mar del Plata Conference). However the most significant move was in 2002 when the UN adopted General Comment 15 under the International Covenant on Economic, Social and Cultural Rights (ICESCR); the human right to water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses. The human right to water was formally recognized in July 2010 when the UN General Assembly adopted resolution 64/292, which; recognizes the right to safe and clean drinking water and sanitation that is essential for the full enjoyment of life and all human rights.

In relation to transboundary watercourses the International Law Association (ILA) has adopted the Helsinki Rules on the Uses of the Waters of International Rivers (1966), the Seoul Rules on International Groundwaters (1986), the UN Convention on the Law for Non-navigational Uses of International Watercourses (1997), and the Berlin Rules on Water Resources (2004). These rules provide non-binding guidelines for the utilization of transboundary rivers and aquifers. In addition they assert the rights of all riparian states to a reasonable and equitable share in the beneficial uses of the waters. It also mandates the protection of the resource from pollution. The Rules provide a solid framework for the resolution of riparian disputes but are non-binding mechanisms in relation to International Law; the rules are simply articles adopted by the ILA. As noted by Gvirtzman (2012:23) they do not provide a clear mathematical formula for the division of shared waters - solutions are primarily pragmatic and do not strictly adhere to "dry" legal principles. Gvirtzman (2012:23-24) goes on to justify Israel's disregard to these rules claiming that signed agreements are considered binding on the parties and cannot be overruled by customary legal principles, therefore the 1995 water agreement signed between Israel and the PA leaves no room for further demands by the Palestinians.

Israel, as the occupying power of the oPt, has specific obligations under International Humanitarian Law (IHL) as stated in the Hague Regulations of 1907 and the Fourth Geneva Convention of 1949. The Hague Regulations impose limitations on an occupying power's sovereignty over the natural resources of the occupied territory including water resources. The Hague Regulations forbid an occupying power from utilizing the resources of the occupied territory for the benefit of its civilian population. The rules of the Fourth Geneva Convention oblige Israel to take responsibility for the welfare of the Palestinian population under its control and to ensure that civilians are provided with, or allowed to secure the basic necessities for survival including access to water. Furthermore, Israel has signed and ratified the ICESCR of 1966 which enshrines the human right to water access within General Comment 15 therefore Israel is obliged to implement this right in the oPt since it is under the Israeli jurisdiction. The Committee on the Elimination of Racial Discrimination (*CERD, 2011*) urges the state of Israel to fully respect the norms of humanitarian law in the oPt and to ensure respect for Palestinians' rights to housing, education, health, water and sanitation (*CERD, 2011*).

As Issac (2010) notes, the weakness of international law is that it can easily be rendered impotent when a state ignores, or is not party to, the laws in question. The Fourth Geneva Convention, for instance, places restrictions on the powers of a belligerent occupier, and provides safeguards for the protection of the rights of those occupied. The Israeli Government however claims that it has not displaced a legitimate sovereign in either the West Bank or Gaza Strip and hence is not bound by the Geneva Convention. Gvirtzman (2012:24) reinforces this idea and claims that the Palestinian demands are unjustified according to international legal norms. The International Court of Justice (2004) has negated this argument and states that the Convention is still applicable and should be respected. Despite the ICJ (2004) ruling, the Israeli contention remains and Israel continues to alter legal and administrative structures and exploit natural resources in the oPt (*Issac, 2010*).

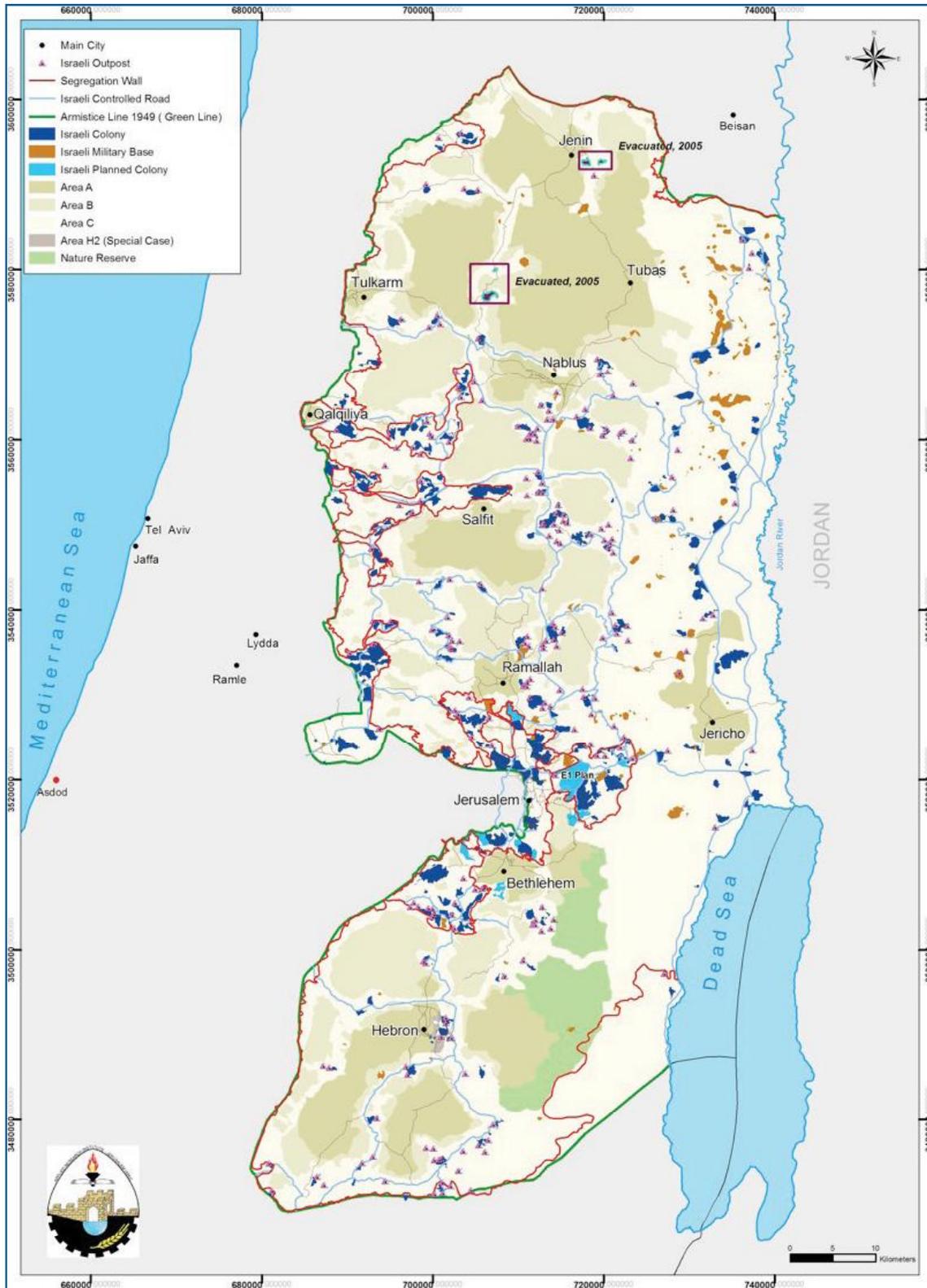
6. The water regime of the Israeli occupation in the West Bank

Following the 1967 Six-Day War Israel initiated its occupation of the Palestinian territory and swiftly imposed military orders to achieve ultimate control over land and water resources. These orders dissolved the legal system that existed before 1967 which consisted of Ottoman, British, Jordanian (in the West Bank) and Egyptian (in Gaza) laws. Military Order 92, issued on 15 August 1967, granted complete authority over all water related issues in the oPt to the Israeli army. Military Order 158 of 19 November 1967 stipulated that Palestinians could not construct or possess any new water installation without first obtaining a permit from the Israeli army and that any water installation or resource built without a permit would be confiscated. Military Order 291 of 19 December 1968 annulled all land and water-related arrangements which existed prior to Israel's occupation of the West Bank (*Amnesty International, 2009*). Today, the administration of water resources in the West Bank is under Israeli control with almost 2000 military orders and proclamations forming the foundations of the occupation (*Glavany, 2011*). Military orders only apply to Palestinians and they do not affect Israeli settlers who are subject to Israeli civilian law.

6.1. Water restrictions and demolitions in Area C

Following the 1995 Oslo Accords, the West Bank (excluding East Jerusalem) was divided into three areas: A, B and C. Area A, mainly fragmented urban centres, was placed under the control of the PA; Area B was placed under PA civil administration but Israeli security control; and Area C which covers the Jordan Valley region, settlements and their surrounding areas, remained under full Israeli control relating to issues of security, planning and zoning. This division was only intended to last until a final status agreement was reached within five years. With the collapse of negotiations in 2000, approximately 36 percent of the West Bank had been categorized as Areas A and B, with an additional 3 percent of land reserved as national parks. This left 61 percent of the West Bank as Area C where 150,000 people live; approximately 18,500 live in small, sedentary villages, and 27,500 reside in Bedouin and other herding communities (*UN OCHA, 2011*). Figure 6 illustrates the division of the West Bank and the geopolitical landscape in more detail. There has been no official change to this division since 2000 and responsibility over planning and zoning in Area C remains with Israel. As explained in section 4.2, Israel has complete control over all water resource planning, development and access in 61 percent of the West Bank.

Figure 6: Geopolitical map of the West Bank. Source: ARIJ, 2009



Water projects and infrastructure within Area C requires an official permit from the JWC and the Israeli Civil Administration in Bet El. This is a long, bureaucratic procedure and often results in permission being denied, even if the project is approved by the JWC (see section 4.2). Projects executed without prior approval are demolished by the Israeli military. Recently there has been a significant increase in these demolitions. Between 2009 and 2011 the Israeli military demolished

173 water sanitation and hygiene structures including 57 rainwater collection cisterns, 40 community wells, irrigation equipment vital for food production and at least 20 toilets and sinks (EWASH, 2012a). This has affected an estimated 14,937 people (UN OCHA, 2012a). Palestinian water structures that have been destroyed include storage and rainwater cisterns, wells, springs, water tanks and agricultural ponds. Some of these structures were demolished under the pretext that they were constructed without obtaining the relevant Israeli permit, but many were demolished without reason. This aggressive policy is intentionally restricting, displacing and eliminating the presence of Palestinians from specific areas of the West Bank. These are areas of particular strategic interest to Israel, usually for the expansion of Israeli settlements and related infrastructure.

This has been the case for Susiya village in the South Hebron Hills. Susiya, like other villages in the South Hebron Hills, is not connected to the piped water network and the villagers rely on cisterns to harvest rainwater and store the water they purchase from tankers. In February 2011 two vital rainwater harvesting cisterns were demolished by the Israeli army. In May 2011 the Israeli army demolished them again following their repair by villagers (ARIJ, 2011). Susiya village is reliant on these type of cisterns due to a dire water shortage in the area, a result of three factors: the prolonged drought; increasingly stringent restrictions imposed by the Israeli army on the movement of Palestinians in the area, requiring long detours for water tankers and increasing costs; and frequent attacks by Israeli settlers on the villagers and their property, damaging and restricting access to water cisterns around the village.

6.2. Israeli settlements

Israel carries out a policy of territorial expansion that aims to appropriate land and water resources. This policy is reflected by the strategic location of Israeli settlements and settler activity in the West Bank. Settlements are Jewish communities that Israel has established beyond the Green Line on land occupied since the 1967 Six-Day War. The Government of Israel has invested, and continues to invest heavily in settlement construction, expansion and defense. Settlement construction and expansion in the West Bank is considered illegal under international law. According to the B'Tselem settlement database (2010a) there are 136 official settlements in the West Bank with a combined population of 300,000. The annual population growth of the West Bank settler population has been approximately 5 percent in recent years, as opposed to 1.8 percent in Israel. In addition to "official" settlements there are also 99 "illegal outposts" that support a population of 6,000 settlers (B'Tselem, 2010a). Outposts are built without official permission but receive support and assistance from Israeli Government ministries. In 2011 the Israeli Government announced plans to officially establish 11 new settlements by legalizing illegal outposts (Peace Now, 2011). In April 2012 the Government of Israel legalized the status of 3 settlement outposts in the West Bank, a decision that was widely condemned by the PA and the international community (Haaretz, 2012).

In order to supply water to the settlements Israel has developed wells in the West Bank (largely in the Jordan Valley), and a water network that is linked into the Israeli national network. The settlements are consuming an estimated 44 MCM of water (World Bank, 2009) and Glavany (2011) argues that Israeli settlers in the West Bank use more water than the 2.4 million Palestinians. Table 3 compares consumption of water in Israeli settlements to nearby Palestinian villages.

Table 3: Water consumption in Israeli settlements and nearby Palestinian villages

Israeli Settlement	Litres/person/day	nearby Palestinian village	Litres/person/day
Beda'ot	401	Tubas	30
Niran	433	Al-A'uja	82
Arganan	411	A-Zubeidat	82
Ro'i	431	Al-Hadidiya	20
Beqa'ot	406	Al-Hadidiya	20

Source: B'Tselem, 2011b

In recent years water springs in the vicinity of Israeli settlements throughout the West Bank have become the target of settler activities that eliminated, or put at risk, the access to these springs and their use by Palestinians. A recent report published by UN OCHA (2012b) identifies a total of 56 such springs, the large majority of which are located in Area C on land parcels recorded by the Israeli Civil Administration as privately owned by Palestinians. Thirty of these springs were found to be under full settler control, with no Palestinian access to the area. In almost three quarters (22) of these Palestinians have been deterred from accessing the spring by acts of intimidation, threats and violence perpetrated by Israeli settlers. In the remaining eight springs under full settler control, Palestinian access has been prevented by physical obstacles, including the fencing of the spring area, its de facto annexation to the settlement (four cases), the isolation of the area from the rest of the West Bank by the Separation Wall (see section 6.3) and its subsequent designation as a closed military zone (four cases). The other 26 springs are at risk of a settler takeover. This category includes springs that have become the target of regular tourism activities of settlers, and/or patrolling by the security coordinators of settlements (OCHA, 2012b). The inability to access and use springs has significantly undermined the livelihoods and security of Palestinians living in affected communities. Many farmers have been forced to either cease cultivating the land or face a reduction in productivity. This also has increased the expenditure for herders and households who are forced to purchase piped or tankered water.

Many springs, and related water infrastructure, that are utilized by Palestinians are also subject to malicious attacks and vandalism from settlers. For example, settlers from the Yitzhar settlement have repeatedly damaged the Al Sh'ara spring and the water pipe which carries water to the Palestinian village of Madama. Settlers have also dumped raw sewage, diapers and chicken carcasses into the spring in order to contaminate it. In February 2010, the spring was vandalised with large rocks thrown in to block the flow of water and as a result the village's water storage tank ran dry in the spring of 2010. In April 2011, water pipes were again intentionally damaged by settlers from the Yitzhar settlement (*Ma'an News Agency, 2011*).

Israeli settlements are also a major cause of environmental pollution in the West Bank as untreated and unregulated wastewater is allowed to flow from the settlements. The amount of domestic wastewater generated annually by almost half a million Israeli settlers living in the West Bank amounts to 54 MCM per year (*ARIJ, 2008*). This is more than the annual amount of wastewater generated by the 2.4 million Palestinians living in the West Bank, a result of excessive water consumption by Israeli settlers. Gvirtzman (2012:21-22) claims that 90 percent of wastewater from Israeli settlements is treated and he instead insinuates that Palestinian communities are causing environmental pollution in the West Bank. However Israeli sources state that only 81 of 121 settlements in the West Bank are connected to wastewater treatment facilities (*Cohen et al, 2008:52-53*). Therefore unconnected settlements discharge 5.5 MCM of raw wastewater which flows down the settlement hilltops polluting wadis and Palestinian agricultural lands (*Cohen et al, 2008, B'Tselem, 2009*). This is the case in Salfit where local residents have witnessed contamination of agricultural lands and water resources, and have contracted serious diseases including cases of cholera. Barqan settlement, near Salfit's Qana Valley, has the largest industrial complex of the Israeli settlements and waste from industrial activity is dumped in sites surrounding Salfit (*Ma'an News Agency, 2012*). In November 2011, wastewater from Revava settlement near Salfit completely destroyed 20 olive trees and flooded a further 100 trees in Palestinian land surrounding the settlement (*Wafa, 2011*). Table 4 exposes a more concise list of the damage caused by Israeli settlements in the oPt in 2011.

Table 4: Israeli violations to the Palestinian environment in 2011

Israeli Settlement	Date of Violation	Violation and Affected Area
Yakir	10-Jul	Pollution of agricultural lands and water springs in Wadi Qana, west of Deir Istiya - Salfit Governorate.
Ariel	11-Jun	Pollution of Al Matwiwell spring which is considered the main source of water in the region and contributes 30 percent of water needs for the City of Salfit and the villages of Farkha and Khirbet Qais (Salfit Governorate).
Kfar Etzion	11-Apr	Sewage and wastewater dumped across 10 dunums of agricultural lands. Wadi Shkhiat in the town of Beit Ummar town (Hebron Governorate).
Kfar Etzion	10-Oct	Israeli settlers dump sewage and wastewater which flows towards large agricultural areas affecting Wadi Shkheit in the town of Beit Ummar (Hebron Governorate).
Alon Moreh	10-Oct	Sewage and wastewater dumped into the lands of Deir Al Hatab Village destroying olive trees (Nablus Governorate).
Sha'are Tekvah	10-Feb	Sewage and wastewater dumped near 'Azzun Al 'Atmeh secondary school (Qalqilyah Governorate).
Ariel	11-Jun	<u>Burqin Village:</u> Sewage is dumped into the areas of Baten Al Hammam and Wadi Al Beer areas, both located west the city of Salfit (Salfit Governorate). The sewage forms a stream that reaches Wadi Burqin on its way to the lands of the village of Kufr Al Deek.
Ariel	11-Apr	<u>Marda Village:</u> the Israeli military pumped sewage from Ariel settlement through tunnels that were constructed beneath the route of the Wall causing sewage water to mix with rain water which then flooded Palestinian lands (Salfit Governorate).
Betar Illit	11-May	Wastewater dumped into the lands of Nahhalin Village southwest of Bethlehem (Bethlehem Governorate)

Source: ARIJ Monthly Reports Database, 2011

6.3. The Separation Wall

Israeli Prime Minister Ehud Barak approved the first project to build a "security barrier" (referred to here as the Separation Wall) in November 2000 with construction starting in June 2002 west of Jenin. The wall is still under construction, and when completed, its length will total approximately 760 kilometers. The Wall is composed of vehicle-barrier trenches, exclusion zones, electric fences and thick concrete slabs stretching 8 metres high. The route of the Separation Wall deviates substantially from the from the 1949 Armistice Line (Green Line) cutting deep into the occupied West Bank. Figure 7 highlights the path of the Wall in the occupied West Bank. In 2004 the International Court of Justice declared that construction of the Wall, and the associated Israeli regime in the oPt, as illegal under international law (ICJ, 2004). The Separation Wall is an attempt to annex Palestinian land under the guise of security (B'Tselem, 2005) which undermines peace negotiations and severely restricts Palestinians movements within the West Bank and Israel.

Figure 7: The separation wall and Palestinian water resources. *Source: ARIJ, 2009*



Construction of the Separation Wall has created Seams Zones that lie between the separation wall and east of the Green Line. Seam Zones have captured 238km² of agricultural land and construction of the wall has uprooted 8.4km² of olive groves and orchards. Seam Zones have caused a loss of 23.3 percent of Palestinian agricultural production with a potential estimated value of US\$ 137.8 million (*Issac & Hrimat, 2005*). This has endangered the food security situation in Palestine and denied farmers a livelihood as they can no longer access agricultural fields

or markets. It is estimated that 1.43 million people in the oPt are food insecure, forming 33 percent of household members (22 percent in the West Bank and 52 percent in the Gaza Strip) (*WFP/FAO/PCBS, 2011*). Concern has been raised about the depletion of agro-biodiversity within the trapped agricultural lands of the Seam Zones. Issac & Hrimat (2005) state that Seam Zones are fragmenting ecosystems and habitats, threatening plant species, and accelerating the rate of desertification.

Water resources have also been lost to the Seam zones following construction of the Wall. The Separation Wall illegally isolates 28 groundwater wells in the oPt (19 from the governorate of Qalqilya), and also 17 springs in Bethlehem. The total yield of the isolated wells reaches 4 MCM per year, which constitutes more than 30 percent of Palestinians' share in the Western Aquifer as stated within the interim agreement (*PHG, 2008*). Figure 7 highlights segregated Palestinian wells and springs following construction of the Wall. Jayyus village, for example, lost two thirds of its land (9,200 dunums) and 6 groundwater wells following construction of the wall. As a result the quantity of water available has drastically reduced to 23 litres per capita per day, drastically below the WHO recommendation levels (*COHRE, 2008*). Prior to the construction of the Wall Jayyus was a leading agricultural area with some of the most productive land in the West Bank due to the availability of water. Eighty per cent of the 4,000 strong community relied on agriculture as a livelihood before 2002, but now Jayyus is reliant on international humanitarian assistance for its survival. Unemployment rates are high and many Palestinians, especially young men, have left Jayyus. The World Bank (2009) estimates the economic losses of agriculture related to the construction of the separation wall and the closure of land located in Area C at 1.4% of GDP and the loss of 14,880 jobs.

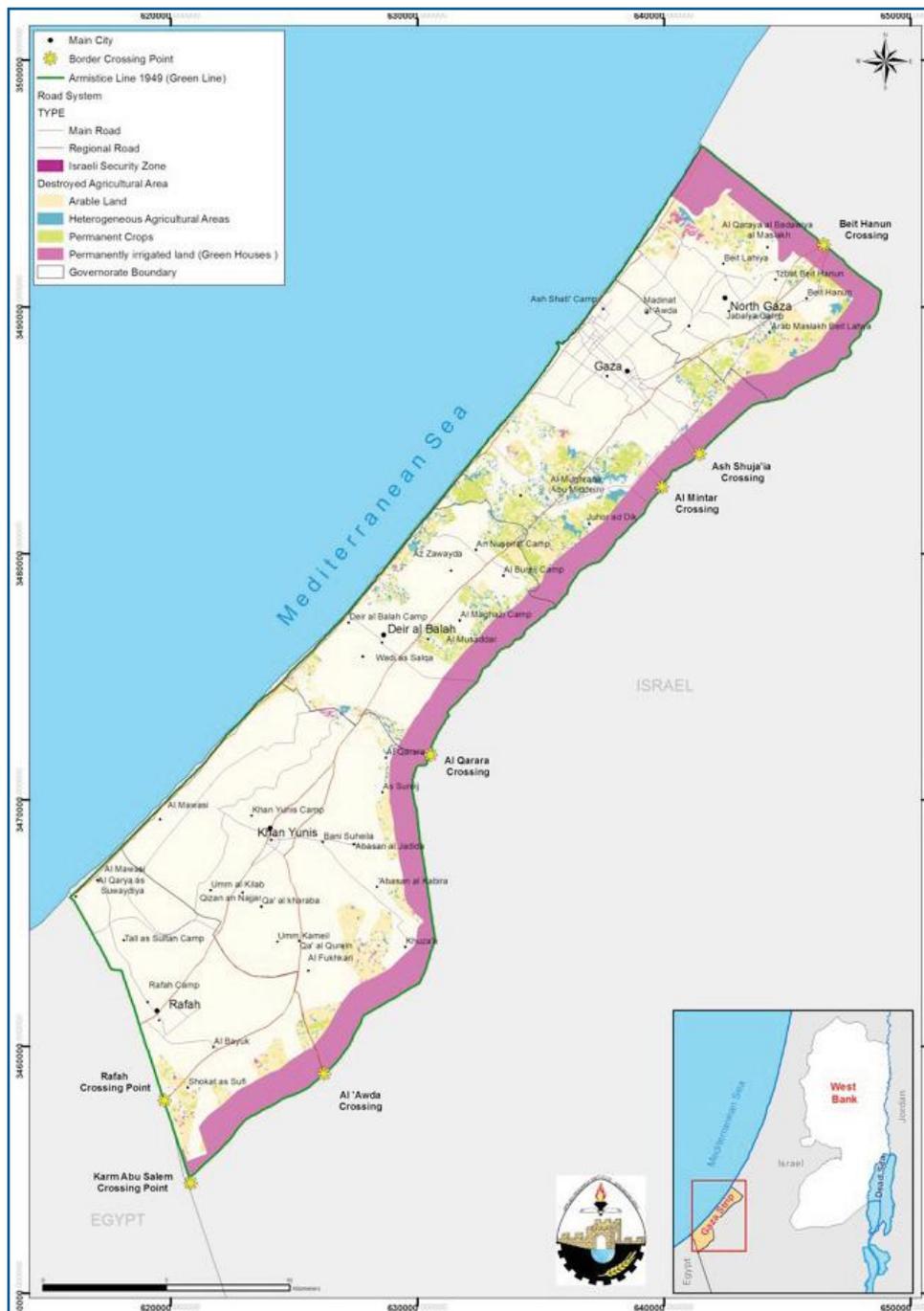
The Separation Wall has also resulted in the de facto appropriation of agricultural wells in the West Bank (*EWASH, 2011*). This loss cannot be replaced by the Palestinians who are restricted from drilling new wells in the Western Aquifer, which is the most productive aquifer in the region, and thus the Western Aquifer itself has essentially been unlawfully annexed by Israel. Messerschmid (2009) argues that whilst a large number of Palestinian wells have been expropriated by Israel due to the construction of the Wall it is unlikely that control over these old agricultural wells was a major strategic goal; rather Israel has sought to assert its supremacy over future ground water development in this area and obtain fertile agricultural land (*Messerschmid, 2009*). The implementation of the Israeli unilateral separation policy within the West Bank, especially the construction of the separation wall, occurs at the expense of not only Palestinian lands and water resources, but it also directly harms and destroys the social life and cultural heritage of the villages that have been segregated from each other or from their agricultural lands.

A Separation Wall also surrounds the Gaza Strip which borders Egypt on the south-west and Israel on the south, east and north. The Gaza Separation Wall is 55 kilometers with a buffer-zone stretching along the entire northern and eastern perimeter ranging from 300-600 metres. The buffer zone has rendered approximately 27,000 dunums of land as "high risk" areas as encroachment into the buffer zone will result in military confrontation. As a result approximately 30% of Gaza's agricultural land cannot be worked without severe personal risk causing the loss of livelihoods (*PCHR, 2010*). Figure 8 highlights the Israeli buffer zone and the agricultural lands of the Gaza Strip. Since 2005 Israel has destroyed 305 water wells located in the buffer zone with a total cost of replacement at US\$9 million (*EWASH, 2012*). Israel has continued to maintain control of the Gaza Strip's airspace, land borders and territorial waters.

7. The water crisis in Gaza

The Gaza Strip is one of the most densely populated territories in the world, with some 1.5 million Palestinians living in an area of 40 km by 10km (see figure 8). More than 1 million are UN-registered refugees (*UNEP, 2009*). Increased pressure on available water resources, combined with an economic blockade and continued Israeli military strikes, has severely weakened the capacity of water and sanitation infrastructure. Gvirtzman's (2012) report fails to mention the water crisis in the Gaza Strip and the Israeli MFA (2012b:37) blames Palestinian mismanagement for the destruction of water supply systems. In reality the situation has manifested directly from the refugee crisis, the blockade, and military assaults all triggered by Israel. The following section will elaborate further on the tragic water situation in the Gaza Strip.

Figure 8: Agricultural lands of the Gaza Strip. *Source: ARIJ, 2009*



7.1. The Blockade

The blockade refers to restrictions on movement and goods across land, air, and sea in the Gaza Strip. The blockade has been imposed by Israel and Egypt since June 2007. Israel eased the blockade for non-military goods in June 2010, and Egypt reopened the Rafah border crossing in 2011 for persons. The blockade on Gaza has led to the periodic paralysis of the water and sanitation sector which has resulted in denial of access to water and sanitation as well as detrimentally impacting quality and safety of water sources (*EWASH, 2011*). The blockade continues to hinder investment in the rehabilitation of damaged water and sewage infrastructure as materials necessary are routinely denied entry into the Gaza Strip. The equipment needed includes water pumps, pipes, generators, computers, building cement, and chloride. Israel classifies these materials as dual-use items that are liable to be used for military purposes, and therefore prohibits their entry. The blockade has also affected the availability of fuel in the Gaza Strip which has impacted water supply and sanitation services. Due to severe fuel shortages at the beginning of 2012, the Gaza power station has been operating at one-third of its operational capacity, triggering scheduled blackouts of 6-18 hours a day, in addition to random unscheduled cuts. In recent months this has frequently shutdown water supply systems, wastewater treatment plants and desalination units (*UN OCHA, 2012c*).

7.2. Water quality and pollution

The water crisis in the Gaza Strip has developed over several decades and correlates with a sharp population growth. In 1948 the Gaza Strip had a population of less than 100,000 people. Following the displacement and exile of Palestinians by Israel since 1948, the population of the Gaza strip has rapidly increased to an estimated 1.5 million people in 2012, distributed across five Governorates (*UNEP, 2009*). The increased demand for water has placed huge pressure on the coastal aquifer system and with no other source of water available Palestinians in Gaza have resorted to over-extraction from the Coastal Aquifer at a rate of 50-60 MCM per year (*PWA, 2012*). This has caused the water table to drop below sea level and saline water to intrude rendering 90-95 percent unfit for human consumption.

The overall consumption rate of water in Gaza is 91 litres per capita per day (*B'Tselem, 2010b*). The Coastal Municipalities Water Utility (CMWU), the sole service provider for water and wastewater services throughout the Gaza Strip, runs 150 wells with a daily capacity of about 233,000 M³ (*EUNIDA, 2009*). There are three wastewater treatment plants (WWTP) in the Gaza Strip; Beit Lahia Plant which serves North Gaza Governorate with an average daily flow rate of 18,000 M³; Gaza Plant which serves Gaza City and the Beach Camp with an average daily flow rate of about 50,000 M³; and Rafah wastewater Plant which serves Rafah Governorate with an average daily flow rate of 12,000 M³ (*EUNIDA, 2009*). The three WWTP are overloaded and have limited treatment efficiency. On average, 7,000 M³ of raw wastewater from the Middle Gaza Governorate is discharged directly to Wadi Gaza which then flows directly into the sea or is contained in sewage lagoons. For example, in Khan Younis, with a population of nearly 200,000, there is insufficient primary treatment and sewage is contained either in on-site septic pits which often overflow into the streets, or in sewage lagoons constructed as an emergency measure. Such lagoons are prone to leakage and collapse, as evident by the collapse of the Beit Lahiya sewage lagoon which killed five people, displaced 2,000 (1,120 were children), and contaminated entire neighborhoods in 2007 (*Save the Children, 2009; EWASH, 2011*).

The chloride ion concentration in the Gaza strip varies from less than 250mg/litre to 10,000mg/litre where seawater intrusion has occurred (*CMWU, 2011*). An examination carried out by the UN Environment Programme on a number of wells in Gaza found that the concentration of nitrates was six times higher than the 50 mg level recommended by the WHO (*UNEP, 2009*). High level of nitrates present in water supplies is liable to cause anemia among children and methemoglobinemia ("blue infants" syndrome) among infants, which often leads to death by asphyxiation. Waterborne diseases are common in the Gaza Strip as a result of poor water quality from private vendors and piped services. The Department of Health of the UN Relief and Works Agency (UNRWA) reports that watery diarrhea, as well as acute bloody diarrhea and viral hepatitis remain the major causes of morbidity among reportable infectious diseases in the refugee population of the Gaza Strip (*UNWRA, 2010a*). Without access to safe water, adequate

sanitation and proper hygiene, children are particularly vulnerable to sickness caused by water borne disease. Furthermore lack of safe water is an immediate cause of malnutrition in children, which can have lasting impact on a child's cognitive and physical development.

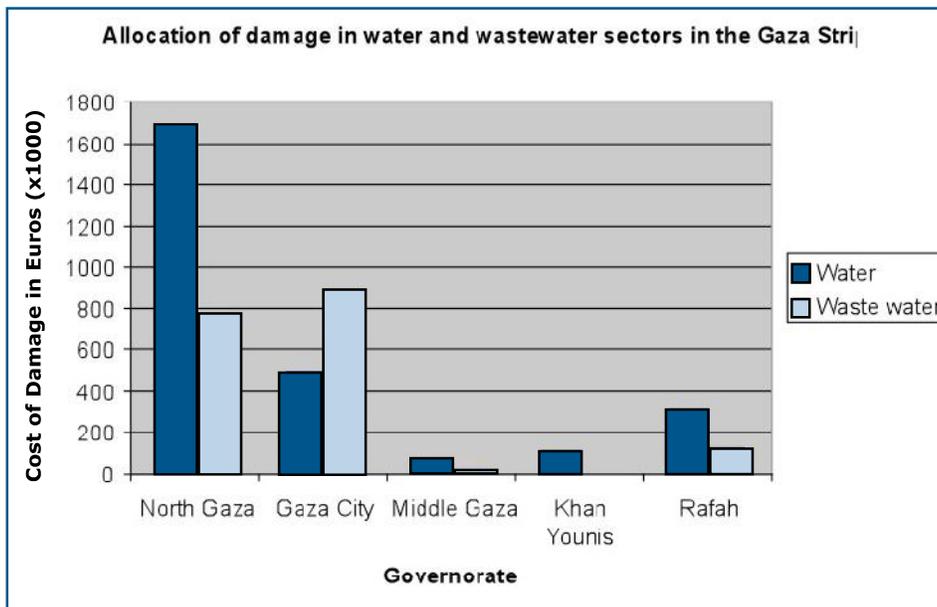
Due to the poor water quality, many Gazans are forced to buy water treated in facilities operated by local entrepreneurs or to use home desalination devices. Treatment of water from pollutants such as nitrates and chlorides is very expensive and the cost of a cubic meter of treated water is a very high - 10 times higher than the price paid by households in Israel. A study conducted by UNICEF (2010) revealed that 86.9 per cent of the households surveyed in Beit Lahiya and Tal el Hawa buy their drinking water from unregulated private vendors selling desalinated water for an average cost of NIS 35/m³ (UNICEF, 2010:9). Many Gazans cannot afford this luxury; the unemployment rate for the second half of 2010 was 45.2% - one of the highest rates in the world. In addition, the average real monthly wage in Gaza overall has fallen in every half-year period, with a cumulative decline of 34.5 percent since the beginning of 2006 (UNWRA, 2010b). The combination of persistently high unemployment and the continuing deterioration of the real wages of working people are major factors fuelling poverty in the Gaza Strip.

The deterioration of water quality in Gaza has also scarred the environment. Everyday along the Gaza Strip, 16 sewage outfalls dump 70-80,000 M³ of untreated wastewater directly into the sea (World Bank, 2009). Faecal coliform bacteria cluster around the outfalls, fish are infected, and the coastline is contaminated, impacting the quality of life of Gazan citizens and the livelihoods of those who depend on marine resources for their income. Fishing is limited to a distance of 5 km from the coastline and the consumption of seafood also creates a further health risk for Gazans. The poor water quality also weakens agricultural yields which in turn impacts the livelihoods of farmers and food security in the Gaza Strip.

7.3. Operation Cast Lead

Operation Cast Lead was a 3 week invasion by Israeli forces on the Gaza Strip starting on the 28 December 2008. The assault resulted in serious damages and destruction to water and sanitation infrastructure as followed; 11 wells were either partially damaged or totally destroyed including 2 in Beit Hanoun, 2 in Beit Lahia, 2 in Jabalya and 5 in Gaza; one water tank in Jabalya was completely damaged and 3 partially damaged in Johr Deek, Moghraga and Wadi Salqa; A total of 75,000 metres of steel and UPVC water pipes were damaged; 9 sewage pump stations sustained either partial direct or indirect damage including 1 in Beit Hanoun, 3 in Beit Lahia, and 5 in Gaza Governorate; In addition, about 5,700 roof storage tanks were destroyed and about 3,000 were damaged (EUNIDA, 2009; Nembrini, 2010). At the operational level the loss of 11 of the 150 wells (about 7%) has had a significant impact on the total daily water capacity, resulting in an increased shortage of water especially during the summer time (EUNIDA, 2009). The military operation also caused heavy destruction to wastewater infrastructure resulting in significant sewage leaks that flooded extensive farm areas. The sewage eventually percolated into the underground water or was discharged into the sea causing coastal contamination (World Bank, 2009). The estimated damage to water and wastewater treatment facilities is estimated at US\$6.2 million. Figure 9 illustrates the allocation of damage in the water and wastewater sectors for the 5 governorates of the Gaza Strip.

Figure 9: Allocation of damage in the water and wastewater sectors for the 5 governorates of the Gaza Strip. *Source: EUNIDA, 2009.*



Israeli military action continues to destroy water and sanitation infrastructure in the Gaza Strip. On August 19 2011, an Israeli airstrike resulted in the destruction of a sewage pumping station. The pumping station had only just been completed to connect 130,000 residents of the Al Nusseirat and Al Bureij refugee camps to a mains sewage system. In April of the same year 30,000 residents in the Gaza Strip were without water for three days as a result of an airstrike that damaged the Al Mintar reservoir. In addition, an air strike in July 2011 destroyed a well serving 39 dunums of land and nine domestic water tanks supplying 59 people with water. In the Gaza Strip, the cost of damage to water and sanitation infrastructure in 2011, as a result of airstrikes, was approximately US\$1.3 million (*EWASH, 2012b*).

8. Conclusion

This paper has attempted to summarise the injustice of the Israeli occupation and its associated control of water resources in the oPt. Israeli occupation policies are clearly manipulating the allocation of water resources and denying Palestinians the right to water. Haim Gvirtzman (2012) attempted to deny such accusations in his report which was endorsed by the Israeli MFA. Analysis of his report reveals little evidence to support his claims. This paper has responded to Gvirtzman in order to reveal the reality of water allocation in the oPt. This paper highlights the significant disparity between Israeli and Palestinian water consumption for both domestic and agricultural use. This paper has also exposed how the Separation Wall, Israeli settlements, military demolitions and the Gaza blockade have all worked to maintain Israeli hydro-hegemony. This situation has been further aggravated by the establishment of the JWC which has formalised these discriminatory arrangements. This has further deterred donor agencies from investing in the water supply and wastewater sector in the oPt. Analysis of the Interim agreement has also revealed that it has failed to equitably allocate water resources and Israel has failed to meet its obligations as stipulated in the agreement.

Both the MFA Israel (2012a) and Gvirtzman (2012) claim that the issue of water scarcity in the region could be changed from a source of controversy and tension to one of understanding and cooperation if both sides are prepared to start planning future water supply plants together. ARIJ supports this statement but must emphasize this is only possible if the Government of Israel adhere to the following recommendations as proposed by the Emergency Water Sanitation and Hygiene group (EWASH) (2012b) as follows; the government of Israel should ensure unimpeded delivery of aid for the water supply and sanitation sector; the government of Israel should end all administrative demolitions of water and sanitation infrastructure and protect civilian property from damage during military operations. The government of Israel should end obstacles on Palestinians to develop large-scale infrastructure in the West Bank to allow for sustainable, long-term solutions to existing needs. The government of Israel should allow water and sanitation materials into Gaza without delay and should end the blockade. The government of Israel should end policies and practices that are illegal under international law and harm the livelihoods of Palestinian civilians (*EWASH, 2012b*). Furthermore the Government of Israel should stop endorsing research that undermines the rights of Palestinians in the oPt. The circulation of this research, such as Gvirtzman's report (2012), endangers the Israeli-Palestinian peace process and undermines real cooperation in the water supply and sanitation sector.

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ARIJ (www.arij.org) is a Palestinian research organization working in the fields of socio-economics, natural resources, water management, sustainable agriculture and political dynamics of development in the area. ARIJ plays an active role in the local community as an advocate for greater cooperation among local institutions as well as international and non-governmental organizations. ARIJ frequently provides current data and research necessary for the formulation of position papers and policy strategies on such issues as land and water resources.



The Emergency Water, Sanitation and Hygiene group (EWASH) (www.ewash.com) is a coalition of almost 30 organisations working in the water and sanitation sector in the occupied Palestinian territory. Established in 2002, its members include international and national NGOs and UN Agencies.